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THE BRICKBVILDER

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THE BRICKBUILDER.

AN ILLUSTRATED MONTHLY DEVOTED TO THE ADVANCEMENT OF ARCHITECTURE IN MATERIALS OF CLAY.

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RESPONSIBILITY OF THE ARCHITECT.

IT used to be said of a well-known Boston architect, long since gone over to the majority, that he had a number of wealthy clients who every year would make over to him a considerable sum of money, telling him to invest it in real estate at his discretion, and would give the matter no further thought until the completed building which the architect saw fit to erect was turned over to its owner. This particular architect enjoyed a high reputation, was deserving as an investor no less than for his ability as an architect, and to that extent was exceptional; and yet though few of us have the opportunities which he seemed to be able to utilize to such good advantage, it is a fact that the responsibilities of the architect are large. The obliging owner who will hand his architect ten thousand dollars before departing for Europe, as described so felicitously by Mr. Rich in his article in our last number, are few and far between; but the number who, perhaps without knowing it, entrust their fortunes and their future happiness to the architect are many, and we fancy are becoming more numerous every year. An educated architect in good practise enjoys a degree of responsibility such as falls to the lot of few professional men. A client sometimes thinks he knows what his house is to be. He has a feeling that he has designed his own house and simply told his architect what to do, when, as a matter of fact, it is the architect's house that is built and not the owner's, and the owner is obliged to depend upon the taste, discretion, and good judgment, as well as the honesty of his professional adviser. We believe an architect is more inclined to err by avoiding responsibility of this sort than by accepting it, and that the success of a building is in no inconsiderable degree measured by the extent to which the architect imprints thereon his own ideas and his own methods. It would perhaps be an incomplete statement to say that the architect should never consider the client's wishes, for, quite aside from the commercial inadvisability of such a course, it very often happens that the restrictions under which the architects may most chafe are spurs in the side of his good intent, prompting him to do his best work; but certainly the architect who is conscientious, who wants to do the best possible thing, will have the largest measure of success if he always refuses to do or lend himself to anything which his trained artistic intelligence tells him is not right. That is to say, an architect, considering all the responsibilities which are thrust upon him, as well as those which he is glad to assume, must, if he is to succeed, be a man not only possessing the courage of his convictions, but possessed as well of very tangible convictions. With such a man, given the problems which come to the average practitioner, his opportunities and his influence in molding public taste, in fostering artistic thought, are very large. Indeed, this phase of architectural practise is the redeeming element which draws into the profession so many bright, capable minds. The pecuniary rewards of architecture are certainly not excessive. In most cases they are small, but the mental satisfaction of leadership, of guiding the taste of the community, is a recompense which atones for much of the lack of personal financial possibilities. This power of the architect, of course, works both ways; it is a responsibility which must be met.

WE can imagine no more disagreeable condition for an educated, conscientious man than to feel that a building which has been entrusted to him is beyond his reach; that he is out of his depth in a sea of artistic troubles, and that he cannot quite keep up with his responsibilities. It is bad enough when he has that uneasy feeling, which we all share at times, that he isn't quite doing his best, but when he tackles a job which he has to admit to himself he isn't able to solve, the very responsibilities which lend so much to the profession may at times become unbearable. Some one has said, not inaptly, that all humanity is divided into two classes, — one the vast majority, including those who are led, the other, the extremely small minority of those who lead, and that it belongs to every one to say in which category he shall be classed. The architect who is not a leader, who cannot take a position of influence, is in the wrong profession. He is in a calling that absolutely demands ideas, that obliges leadership, and if he cannot meet that demand, if the opportunities the profession gives him he is unable to respond to, the quicker he finds it out and turns his energy to something else, the less mortification he will have in comparing his work with those around him. The successful architect is always a leader, a molder of thought.

ALTHOUGH it is easy for the architect to arrogate to himself a high position in the creative art world, it must not be forgotten that a very large share of the success of any architectural work belongs to the silent workers who are able to carry out to at least relative perfection the ideas of the artist. Therein is the function of the trained mechanic, and the debt which architecture owes to some of our mechanics is a large one. Take the single department of terra-cotta; we have at different times illustrated in this journal some of the best of the modeled work which has been executed in various parts of the country, and the names of the architects have been quite

rightly associated with the buildings and with the work. The ideas were theirs, the design, the arrangement they could wholly claim; and yet we are supposing no lack of ability when we make the statement that it is doubtful if one architect in a hundred could actually model the terra-cotta which goes into his building, or be able to more than approximately indicate the style of detail in modeled work. It is not necessary that the architect should be a fine modeler, nor even a remarkable draughtsman. The drawings which Michael Angelo made for the dome of St. Peter's, measured by the work of some of our modern accomplished draughtsmen, are mere rude, illiterate scrawls, but the ideas are there. To execute the work, however, we must have trained mechanics, trained not only in manual dexterity, but in the appreciative artistic sentiment which will enable them to grasp the suggestion of the architect and carry it out in its full richness.

WITHOUT the help of the mechanic, the artisan, and the manufacturer, the art of the architect would avail him but little and his leadership would be barren of results. A large modern building represents an extent of cooperation which is almost inconceivable to one who has not been through it all; and while the inception is with the architect, and the merit of the work is measured by the correctness of his ideals, the actual building operation is a result of coordination of forces which the architect can only start in motion and guide in their course. And just as responsibility is measured in a certain sense by its limitations, so the responsibility of the modern architect becomes the greater because of the interdependence of the arts, sciences, and manufactures which enter into a modern structure; nor is the responsibility to the mechanics who put themselves under his direction by any means the least of the obligation which the architect has to assume.

CORRESPONDENCE.

FRESNO, CAL., Sept. 1, 1898.

EDITORS BRICKBUILDER: — In the April number of THE BRICKBUILDER, Professor Baker, in his interesting article on the "Strength of Brick Masonry," propounds this query: "Why did the pier fail in the larger portion under less than half the stress the smaller portion bore without any signs of failure?"

This peculiarity in the cracking of brick masonry is of frequent occurrence in building construction, and I think it can be scientifically explained.

We will assume in this case that the pressure was applied uniformly per square inch on the top of the pier by the plate covering its entire surface.

The lines of pressure would then be vertical, and save for the weight of the brick, the pressure would be uniform per square inch for any height of the pier, the section remaining uniform.

At the enlargement of the pier, the tendency would be for the pressure to distribute itself over the entire section. The amount of this pressure distributed outside of the vertical lines of the smaller top part of the pier would be upon the cumulative principle, similar to that which obtains in metal construction where stress is transferred to reinforcing plates through the rivets.

In the case of this pier, and all similar construction, the mortar joints directly under the initial lines of pressure become compressed, and the tendency to transmit a portion of this stress to the enlargement of the pier brings a tensile stress upon the under surface of the bricks due to flexure, which, I think, is the explanation of the rupture.

If Professor Baker will examine the brick buildings in his city, he will probably discover instances of this kind of failure. Where beams supporting heavy front walls are improperly placed upon the supporting piers or side walls cracking of this kind may be found.

Very respectfully yours,

A. C. SWARTZ.

THE writer's answer to the foregoing question, *i. e.*, the explanation of the cause of the failure, is found in the middle of the first paragraph at the top of the second column, on page 78, April number. It is as follows: "The failure is due to the compression of that portion of the bottom section directly under the top section, thereby causing the compressed portion to shear off from the uncompressed part of the base section."

Mr. Swartz's explanation does not differ materially in principle from the above, except that he directs attention to the bending that always accompanies shear. The writer believes that the phenomenon is more an example of shear than of bending. However, the knowledge of this method of failure of piers and its application in design is the important fact to be kept in mind.

IRA O. BAKER.

CHAMPAIGN, ILL., Sept. 15, 1898.

PERSONAL.

BROUSE & AREND, architects, of Trenton and Asbury Park, N. J., have opened an office at 931 Chestnut Street, Philadelphia, and would be pleased to receive samples and catalogues.

WALTER I. GIDEON, architect, has opened an office in the Sheppard Building, Springfield, Mo. Samples and catalogues desired.

ILLUSTRATED ADVERTISEMENTS.

IN their advertisement, page x, Fiske, Homes & Co. show another of their series of Brick and Terra-Cotta Fireplace Mantels.

A residence at Baltimore, Md., of which C. L. Carson is the architect, is shown in the advertisement of Harbison & Walker Company, page xv.

The White Building, Boylston Street, Boston, Winslow & Wetherell, architects, is shown in the advertisement of the Boston Fire-proofing Company, page xxii.

TYMPANUM IN DORMERS, PUBLIC SCHOOL, 108TH AND 109TH STREETS AND AMSTERDAM AVENUE, NEW YORK CITY.
Executed by the New York Architectural Terra-Cotta Company.
J. B. Snyder, Architect.

In the advertisement of Henry Maurer & Son, page xxiii, there is illustrated a section of their new "Eureka" Floor Arch. This arch is especially designed for light fire-proof construction.

The Celadon Terra-Cotta Company, Limited, illustrate in their advertisement, page xxvii, four patterns of decorative roofing and siding tiles.

The American Schoolhouse. XI.

BY EDMUND M. WHEELWRIGHT.

IT goes without saying that every plumbing system should have a line of soil pipe of extra heavy cast-iron pipe, which has been subjected to the water test when in position, that this pipe should be

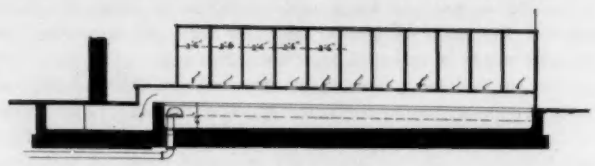


FIG. 1.

extended above the roof, and that, where the conditions admit, the house trap should be placed outside the building in a brick man-hole of sufficient size to be of ready access.

In the installation of plumbing in any building, but especially in schoolhouses, the three things most essential for the fixtures themselves are, first, metal or submerged joints for all fixtures; second, in view of the usually poor janitor service, fixtures of types readily cleansed; and, most important of all, free and constant local ventilation of the fixtures.

No fixture should be used which has a putty, wax, or otherwise packed or gasketed joint, and in water-closets, if the trap is not of iron or brass, the joint between the trap and the soil pipe should be below the water line of the trap, so that if there is the slightest disconnection at the joint, as is liable through shrinkage, settlement, or violence, the dripping water will make the defect immediately noticeable.

When the janitor service is thoroughly efficient the question of possible external uncleanliness of soil-disposal fixtures is eliminated, and separate water-closets with strong local ventilation are preferable to latrines or ranges. Water-closets, however, involve greater first cost and are subject to danger of breakage. Given either a water-closet, brick latrine, or range, if arranged with strong and constant local ventilation, it is on the outside and not the inside of these fixtures that the conditions detrimental to health are generally to be found. The inner surfaces are constantly wet, and hence keep the germs out of the air; and these inner surfaces are, besides, subjected to cleansing currents of air constantly moving away from the inclosure. Outer surfaces become coated with dirt, which, as it dries, flakes off, and, becoming dust, is breathed in with the air. In the brick latrine the external surface is minimized, and if properly constructed can readily be cleaned both inside and out; in the intervals between the flushing the fœcal matter is submerged in water, and at a lower point than in the water-closet ranges. These latrines can be perfectly ventilated at a relatively slight cost. Figs. 1 and 2 show a readily cleansed form of brick latrine which has proved in use to be effective and unobjectionable.

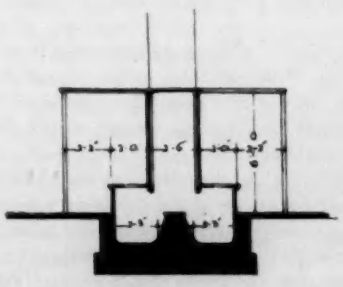


FIG. 2.

Brick latrines must, however, be constructed with great care, so that there shall be no possibility of the pollution, through leakage, of the ground below the basement floor; these latrines must be also connected with an ample vent shaft, which must be kept constantly heated summer and winter; and if given strong and constant ventilation, they may even suffer considerable neglect by the janitor without danger to health of the occupants of the building. In the construction of brick latrines, Portland cement only should be used; thoroughly plastered outside and in with Portland cement, with a final coat of neat cement smoothly hand floated, and covered from the air until it has set perfectly hard. The latrine seats are preferably made of iron, and where wood is used the under side of the woodwork should be lined with sheet lead. The seats should be self-closing. Latrines should have automatic flushing attachments arranged to flush every two or three minutes, and should be provided with a 3 or 4 in. stand-pipe, which should be removed just before recess, by the janitor, to give a thorough flushing and change of water.

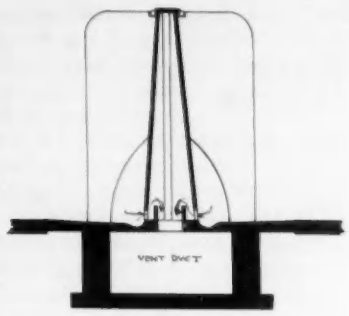


FIG. 4.

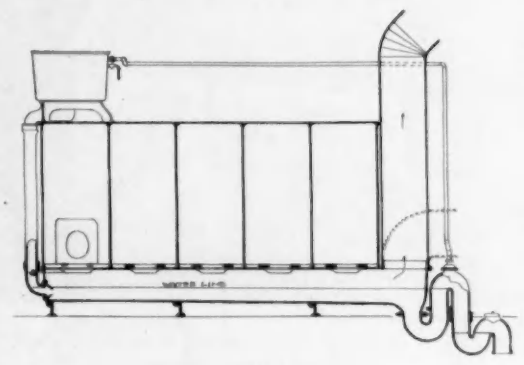


FIG. 3.

The water-closet ranges are arranged so that but little water stands in each section, and when flushed the trough is thoroughly cleansed. The outer surface is more easily kept clean than is that of an equal number of water-closets. Previous to 1895 such fixtures as were then on the market had no provision for local ventilation. Fig. 3 shows a water-closet range with an attachment suggested by Mr. Frederic Tudor which obviates thoroughly this advantage.

The so-called "dry systems" of soil disposal should not be used where there is a sewer system, and even where there is no sewer the use of such systems is not advisable. The soil, reduced as it is to powder by heat, is in a condition most menacing to health, and if the draught of the vent stack is at any time defective, as it may often be through the neglect of the janitor to maintain the heat in the stack, there is a reverse current. This powdered matter may pervade the building and spread contagion.

The privy vault is an expedient which is not to be considered. For a building without sewer connection, earth closets are most advisable. They should have thorough local ventilation and should be in a separate building, which should be heated.

FIG. 5.

Any system of soil disposal which has sewer connection may be placed in the basement of a building with perfect safety, providing a strong and constant ventilation is maintained through the fixtures themselves to a vent shaft carried above the roof. Such vent shafts should have at least 5 sq. ins. of cross-section area for each

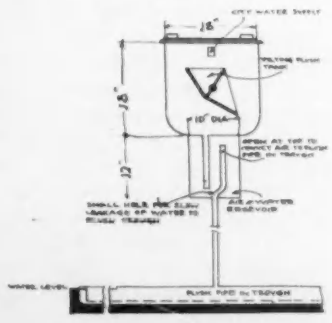
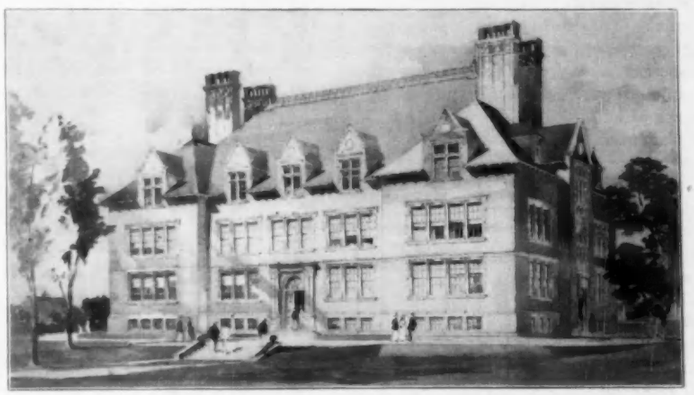


FIG. 6.

seat, and to insure a powerful aspiration at the least expense the boiler or furnace chimney may best be utilized. In this chimney the smoke flue of boiler iron will furnish all the necessary heat when the heating apparatus is running; and to provide for the periods when heating of the building is not required, a small stove or open hard coal grate should be placed at the base of the shaft. It should be made absolutely incumbent on the janitor to maintain this small fire when the heating apparatus is not being run.

In the opinion of Mr. Tudor, these stoves or grates should have a capacity of 20 sq. ins. for each schoolroom. There should be one water-closet for every fifteen girls and one for every twenty-five boys.

Urinal bowls require even more care in cleansing than do water-closets; indeed they require care that is not given by the average janitor, and must, therefore, for practical reasons be rejected in schoolhouse work, except in special cases: as, for instance, in some high schools, where usually a better class of janitors is employed than in the lower grades. A sloping slate slab provided with ample means of ventilation at the bottom, as shown in Fig. 4, and with an automatic flushing apparatus, as shown in Figs. 5 and 6, has proved to be suitable and cleanly. If it were certain that the whole of the fixture would be washed daily with hot water, the "dry system" of urinals is satisfactory, for there is not absolute need for water flushing of the slate while in use, providing the ventilation of the fixtures is strong and constant. The back slabs of slate urinal constructions should have a slope of 1 in 10 and the foot slab should incline inwards 1 in 20. All joints of the slate work must be waterproof.



PROPOSED HIGH SCHOOL BUILDING, MARLBORO, MASS.
Wheelwright & Haven, Architects.

To avoid the spread of skin diseases, set bowls should not be used in schoolrooms; sinks fitted with faucets or with a row of small nozzles should be provided.

For the same reason, where bathing facilities are given, set tubs or swimming tanks should not be used unless they are subjected to careful supervision by the master. Shower and needle baths are entirely unobjectionable.

If the best results are to be obtained in the heating and ventilating of schoolhouses, as indeed in any buildings where ventilation is an important consideration, it is requisite that the heat and air ducts should be planned when the building is first designed. It is not to be expected that an architect can be intimately conversant with a subject to which accomplished men are forced to devote all their energies if they are to master its difficulties. Few architects can therefore do their full duty if, without consultation with a heating engineer, they undertake to design a heating and ventilating system, unless it is such a one as has been almost exactly paralleled in a former building constructed by him with expert help, and even then the assistance of an expert is very requisite if the proper adjustment of the work and its best construction is to be assured. Except in rare cases, if the architect seeks without expert professional advice to select a system presented by a contractor in competition, it is almost certain that the result will be disappointing. If a client is unwilling to compensate the expert, the choice of a system by commercial competition is all he can fairly expect his architect to furnish. The architect should not certainly pay for such service, as it is rendered primarily for the client's benefit; and if the expert is competent, the expense of such service will be offset, if not by the first cost, certainly by the greater efficiency and practical economy of the plant above that usually furnished by the lowest commercial bidder upon plans and specifications prepared by that bidder.

The following notes in regard to the subject of heating and ventilation may prove of service in the preparation of plans: —

1. When a plenum fan is used 5-boiler horse power should be reckoned for each schoolroom or other room of equal size; an assembly hall to be reckoned as two schoolrooms.

For an indirect system of heating and ventilating a boiler capacity of 7 horse power per schoolroom is required.

2. The fan should not be relied upon to supply heat as well as fresh heated air; the building should be heated by direct radiation, and for ventilation fresh air heated to 70 degs. should be supplied by a plenum fan. This method is advisable in any school except the very smallest, and indeed in the schools of four or six rooms a gas engine may be advantageously used as a source of power, so that a definitely directed air supply may be had without requiring the services of a skilled engineer as janitor. In such cases, however, the janitor must have sufficient capacity and conscience to appreciate that the engine should be kept clean.

3. Another advantage of the use of direct radiation for heating is that the rooms may be quickly warmed. It is desirable, also, that the fan should be used in the early morning hours, but that the air should be drawn not from outdoors, but from the building itself. But when the building is occupied the air should be invariably taken from outside the building.

Where space for direct radiation is limited, as is usually the case in laboratories, the temperature of fresh-air supply may be increased to compensate for lack of direct heating by passing the air for the room through a supplementary heater at the base of the air duct for the room.

"Indirect heating," dependent as it is upon the direction and velocity of the wind, is less certain than the method of heating and ventilating advocated above, and it involves a greater combustion of fuel to procure the same results. This extra cost is largely due to the necessity of inducing the flow of air through the vents by means of steam coils. The percentage of the additional consumption of fuel required by heating by "indirect radiation" with heated vents above the cost of heating by direct radiation and with fresh heated air supplied by the fan is reckoned to be twenty-five to thirty-five per cent.

4. To thoroughly heat by direct radiation a room with a southerly or easterly exposure, 1 sq. ft. of radiating surface should be allowed for every 100 cu. ft. of the enclosure. For rooms with westerly and northerly exposures the heating surface should be 1 sq. ft. for every 70 cu. ft. of the enclosure.

5. In a schoolroom 28 by 32 ft. the air inlets and outlets for "indirect radiation" should be 4½ sq. ft. for the lower rooms, ranging up to 6 sq. ft. in the third story. Where plenum fan is used the air outlets remain as above, but the air inlets are reduced 25 to 30 per cent. Under ordinary conditions the architect may safely give the maximum areas to the flues, for the volume of air

which passes through can be regulated by dampers; and if on account of some constructional necessity he wishes to reduce their sizes in any particular case, he can get the advice of an expert. It should be borne in mind that the minimum advisable air capacity per pupil is 30 cu. ft. In assembly halls and other large rooms, or in rooms with but one outer wall, there should be two air outlets.

The best results are attained where air outlets are placed on inner walls only. Air inlets may be placed where most convenient. To avoid draughts, air inlets for schoolrooms and assembly halls should be placed with bottom of register face 7 ft. above the floor. In small rooms the air inlet may be near the floor. If properly protected from the lodgment of dirt, the most effective position of an air inlet is the floor.

Inlet and outlet ducts should be fitted with dampers, the former to be mixing dampers, so that the external air admitted to the room may have its temperature regulated at will. The air inlets should be fitted with deflectors, so that the air will be thrown towards the ceiling and be given proper diffusion. Air outlets should have openings for winter ventilation as close to the floor as possible, and for summer ventilation close to the ceiling. The summer opening for ventilation should be fitted with a register; that for winter ventilation requires a face only.

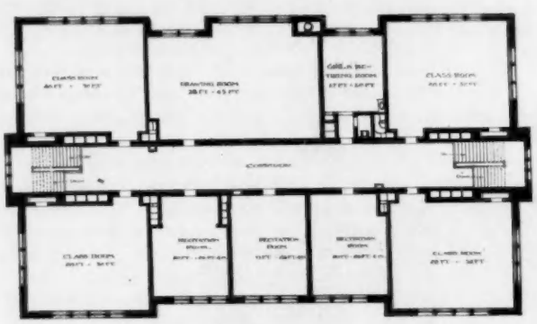
Unless a school is certainly to be blessed by the services of a thoroughly efficient and faithful janitor the heating system should be regulated by automatic control. No excuse should be afforded the teachers of cooling off the rooms by the opening of windows; in doing this the advantages of double windows are nullified, the heat is wasted, the flow of air through the designed channels is disturbed, and dangerous draughts are caused.

The ventilation of a schoolroom may be through its wardrobe. Heat is in this way given to the smaller room, a cleansing current of air passes through the clothing, and the possibility of air from the wardrobe finding its way to the schoolrooms is avoided.

As noted in regard to plumbing, the soil-disposal fixtures and urinals should have strong local ventilation which should be adequate to insure a constant current of air through the toilet room to the aspirating shaft, so strong that by no peradventure the air of the toilet room shall pass into other portions of the building. In corridors the movement of air should be so arranged that it passes thence to the schoolrooms, and not *vice versa*.

It should be better recognized than it is by school committees, that upon the faithfulness and knowledge of the janitor depends to a great degree the health and comfort of the inmates of the school. Janitors are too often found to be either faithless or ignorant, or both, and consequently not only does unnecessary discomfort result, but waste of fuel, injury of apparatus and fixtures, and serious sickness and deaths. The writer knows of no city where an effective system of janitor control has been adopted, the only organization of the janitors being that made by themselves, which have not the object of self-improvement, but that of any like "political" organization. Twenty-five years ago Mr. Philbrick, Superintendent of Boston Public Schools, recommended that the janitor service of the schools of that city should be placed under the control of a chief who should have full power of appointment and removal. No steps have as yet been taken to this end.

There should be certainly such direct executive control of janitors. At stated times, together with other duties, the janitors should be required to make record of the outside temperature as well as in all portions of the building, and they also should keep a record of the amount of coal consumed each day. They should be at any time subject to visits from their chief, and subject to his discipline without resource to the school committee.



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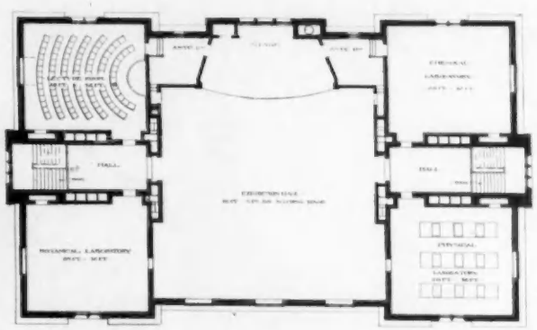
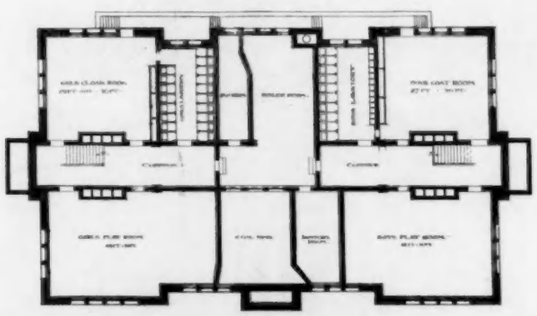


THIRD FLOOR.



BASEMENT.

FIRST FLOOR.

PROPOSED HIGH SCHOOL BUILDING, MARLBORO, MASS.
Wheelwright & Haven, Architects.

Suburban Residence Built of Brick.

COST, TEN THOUSAND DOLLARS.

BY EDWARD B. GREEN.

IN preparing these sketches, the requirements of the program have been kept in mind, — the use of clay products; a home for a family of moderate means, of quiet and refined tastes, preferring a suburban to a city home; a lot 75 ft. wide, facing the south.

The requirements seem to limit the style of the exterior to the Italian or English Domestic, the latter style being adopted in these drawings.

The house facing south, two and a half stories in height, and the lot on which it is placed being lower by 10 ft. on the west side (the left-hand side facing the house) than on the east, the more effective approach is on the west or low side. This will give, as one enters the gate, a view of the lot unbroken and rising to the building, and a better effect can be gained of the lay-out and planting of shrubbery and trees. No effort has been made to lay out the grounds in a formal manner. The taste of most of us who wish to live in a suburban home is to "throw off our coats," so to speak, and be unconventional. An unbroken expanse of grass leading to hardy shrubbery and trees surrounding the house and lot lines, and the house itself well covered with vines — no unnecessary walks or roads, and these without curves — will make the most charming home scene to be imagined — no "fuss or feathers." A pool of water near the entrance — not a fountain — will, if rightly placed, add to the effect and quiet by reflecting the home and surroundings as one enters.

The main entrance of the house is approached by a series of wide and broad steps, built of hard, rough (paving) bricks, balustrade, a brick wall, and all more or less covered with vines and shrubs, leading onto the terrace, which may be paved with brick or gravel, but preferably covered with grass. The reflection of a pavement or floor would be disagreeable, and at times hot. At least some part of it should be of grass, — that part which shows from the windows, leaving sufficient amount of space to sit, to be paved. With a double awning of dark colors, to let down, the reflection will not be strong, and a most cozy place can be arranged.

The family, for general use, will find the side entrance more convenient; it is easily approached from the carriage road (a suburban home means a horse and depot wagon). On entering, one finds a side hall running widthwise of the house, between the kitchen wing and the main building, and ending in a large coat room under the landing of the stairs, also provided with a lavatory. This will be found most convenient for the rubbers and storm coats of the family. It will also prove a convenience for guests on rainy nights, and even on more formal occasions, as the side staircase can be used as the guests arrive and depart. It will be noticed that the door of this side entrance enters at the level of the ground, on the low side, so from the landing of the stairs it is but a few steps to descend to the level of the cellar floor, or but a few steps to the level of the main floor; it will, therefore, be convenient to put your "wheel" in the room provided for it under the dining room. This being well lighted, and 14 by 14 ft., can also be used as a shop for those members of the family — always to be found — who delight in tinkering and mechanical devices.

To the rear across the side hall is the kitchen portion. It is designed that this part of the house and the portion directly above it shall be devoted to the servants and their work, and both floors are carefully separated from the rest of the house, — the butler's pantry on the first floor, as well as the kitchen, is separated from the dining room by the width of this cross hall, — not sufficient space to cause any inconvenience in serving, yet so separating the "business end" of the house that odors or noise are not perceptible.

The kitchen, by some, might be considered small (10 by 14 ft.), but with large pantries, — the range placed in the corner out of the way, and provided with a large ventilating flue, — and with a servants' dining room (a necessity in suburban life), store room, and refrigerator room in such position as to be most convenient. It saves labor to have these things as small as practicable.

The servants' quarters, on the second floor of the kitchen por-

tion, include two servants' rooms, bath, house-maid's closet, and linen room.

It will be seen that advantage has been taken of the southern exposure. From the street this gives the house a broad appearance, but it is done with a view of getting the sun in every room, not to make the house look big.

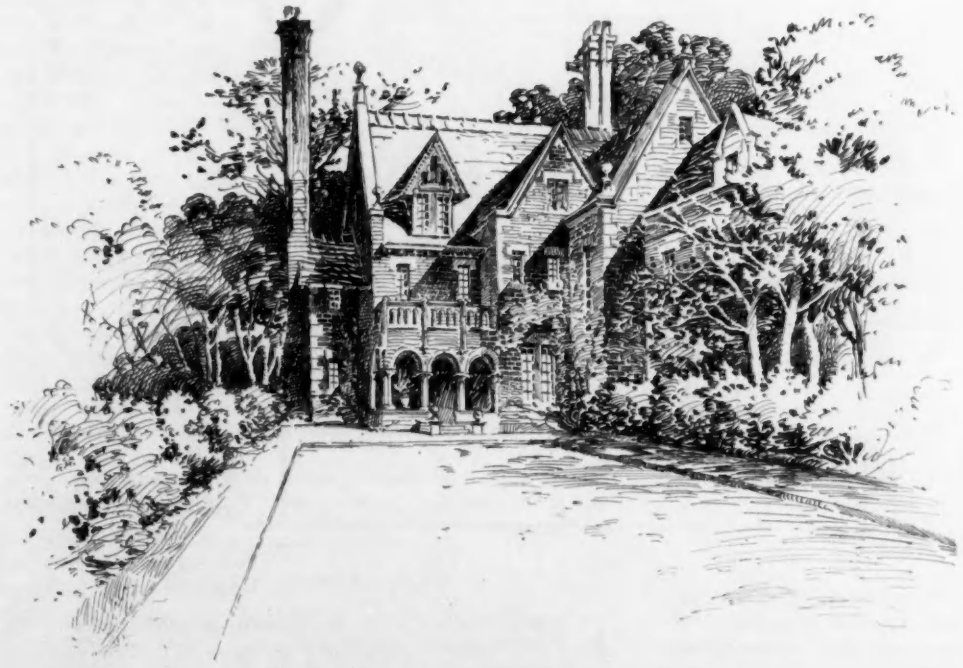
The main entrance and enclosed porch of glass (which can be taken down in hot weather) leads into the hall; the south end, being cut off by pilasters and beams on the ceiling,— rather than doors,— forms a small reception room. The social life of the suburbanite being more informal than that in the city, a large reception room seems unnecessary. The most space and greatest effort should be devoted to the library, or living room — it should be *the* room of the house.

Next in importance to the living room is the dining room. Off from the library is a little "study" or "den," — a most useful room for a student, — or it is a room where the man of the house can retire to do thoughtful work, or smoke or grumble to his heart's content, or see a friend.

The inglenook fireplace at one end of the library is cozy and warm on a cold day. As people who love a wood fire want the least excuse to have one, it is therefore convenient to have it somewhat retired, so that it will not overheat the room in warm weather.

It will be noticed that the arrangement of the house has the advantage, on entering, of making the house appear large, the full length of the house being lengthwise of the living room and dining room, stairs at one end and reception room at the other end of the hall — the lines of the longest dimensions are shown.

The porch on the north side of the library is covered, and overlooks the court or private garden; this could be made large enough



for the tennis court. It is suggested that this court be surrounded by a pergola or a hedge 6 or 8 ft. high, shutting out the kitchen yard, to make an entirely private or enclosed space. It also makes a shady walk.

The dining room is designed to be a square room, in order to accommodate a round table. In a small house this is desirable, because it will always accommodate more guests than the same number of square feet in a narrow, long room, and yet not appear to be as crowded The round table need not be changed in its dimensions, except for extraordinary occasions. An ordinary round table 4½ to 5 ft. in diameter does not seem too large for only two, and will conveniently seat six or even eight, if two or three are children. The dining room has a corner fireplace, and a sideboard built in, balancing the mantel.

The idea is to finish the library and hall in dark quartered oak; the dining room white, with mahogany furniture, tapestry walls, the library surrounded by low bookcases to form a wainscot, and, if a great number of books are to be accommodated, the cases should run to the ceiling; use the books as *the* feature.

The stairs, first and second floor, run up at the rear of the hall, with a large landing on the second floor. The guest room opens directly from this hall, and has its separate bath. corner fireplace in corresponding position to the fireplace in the dining room below.

The family rooms (three) are in a row, facing the south, and all opening onto a corridor, which corridor, in turn, by a sliding door, opens into the main hall. By this arrangement the family rooms are made a suite, which is cut off from the rest of the house. This separation of the family apartments gives additional privacy, and prevents the children from being disturbed by music or unusual noise from below; and, on the other hand, the children do not disturb those below. Each of these family rooms has a fireplace and one or more closets. From the family room on the southeast a

balcony opens to the north, which is most useful for airing clothing, and will be a cool retreat in hot weather.

Rooms could be finished as a trunk room, store rooms, and, perhaps, one or two small bedrooms in the attic.

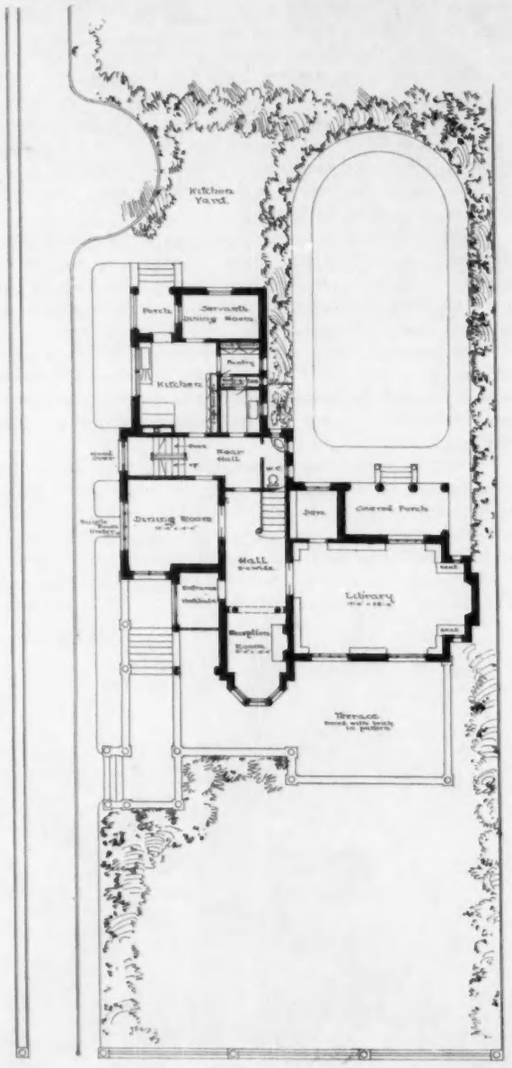
In the cellar the usual things are provided for,—space for heating apparatus, store rooms, wine cellar, laundry, bicycle room, etc., etc.

Materials: The house is designed to be built of rough common sand brick, hard burned, brown in color, preferably not of an even color, being darker at the bottom and growing lighter toward the top, the idea being to reproduce somewhat the exquisite colors of a meerschaum pipe,—rich browns, the brick to be selected from those that are nearest to the fire and being "fire marked." They are to be carefully laid up, with wide joint, joints "struck." The bricklayer can show a great deal of ingenuity and artistic feeling in bricking out the design, in the use of his colors. The mortar is to match as nearly as possible the color of the brick. All the moldings, string-courses, copings, sills, and mullions are to be of molded brick and terra-cotta, as the case may be, as indicated on the plans.

The house, if placed in among a number of large trees, to have a dark red tile roof; if standing pretty well in the open, a shade of green slightly glazed.

The exterior walls to be laid with a hollow space 2 ins. wide, the exterior course being tied to the interior wall with any of the patterns of metallic ties. This will give a thoroughly dry wall, and also do away with wood furring on the interior; or, a solid wall can

be built and furred on the interior with terra-cotta, or the ordinary brick furring, but a clear air space must be given between the furring and the wall, if it is desired to have a dry wall. The additional cost of making fire-proof floor partitions is little, probably in this scheme not over five or six hundred dollars. There are a great many methods that could be followed out, and which might give even more satisfactory results than the ones mentioned above. When the general public find that fire-proof work can be built for a very little additional price over the present work, and that the more it is used and the more accustomed the masons get to it the cheaper it can be done, its use will be greatly extended. The hall could be floored and the stairs built of brick or slabs partially glazed, the treads being of slabs of marble, balustrade of terra-cotta glazed; all the mantels and fireplaces to be of brick and terra-cotta, shelves or seats being glazed (this does not mean a high glaze). Cellar



walls to be built without the use of stone, over-burnt brick being used to the grade line. At this point a glazed course of terra-cotta or brick.

PROFESSIONAL ETHICS.

IF good professional ethics in relation to one another were the rule among architects, while the conditions of practise would be more conducive to doing good work, the total result in the distribution of employment would be much the same as if the "get there" idea were to prevail. Professional habits, as followed by those of the profession who have, as the French say, "arrived" are rather an index of how they achieved their position than, as is sometimes supposed by the irregulars, a creation to help them to keep it. The only way to permanent success is expertness, and this is to be attained not by working for work but by working at it.—*Canadian Architect.*

Balcony and Parapet Balustrading.

BY THOMAS CUSACK.

WHAT has been said in depreciation of sheet-metal cornices applies with equal force to the misuse of that material in balustrading. Many a creditable and, otherwise, well-executed design has been marred beyond redemption by a hollow pretense of make-believe balusters ranged along the parapet. It is, of course, customary to paint tin and galvanized iron affairs of this kind in simulation of the stone or terra-cotta used elsewhere on the building. Indeed, some of the most experienced artificers in this line go the length of sanding the receptive pigment, hoping to complete the deception. Viewed from afar, the counterfeit may pass as currency, but on closer acquaintance the hollowness and insincerity of the whole thing become painfully apparent. Not only is the building thus placed at a discount; the disillusion has a far-reaching suggestiveness in its bearing on things of real merit, detracting from their value in a, perhaps, disproportionate degree.

In situations where it may be expedient to obtain a desired effect on walls not calculated to carry much additional weight, copper becomes permissible — providing it be used frankly, and left to tell its own tale. At this point, however, a discriminating architect usually draws the line — unless overruled by a client in whom the penny-wise commercial instinct is paramount. In the latter case, all that may be said about consistency, homogeneity, or architectural continuity falls upon ears that hear not. To such a one an appeal, to be successful, must be made to his pocket, and in language with which he is familiar — the relative cost, for instance, is a turning point to which he will give due attention. The relative durability, and cost of maintenance, etc., are items that cannot be disregarded; for, even on his own ground, it is not the initial but the ultimate outlay that must be taken as a basis of comparison.

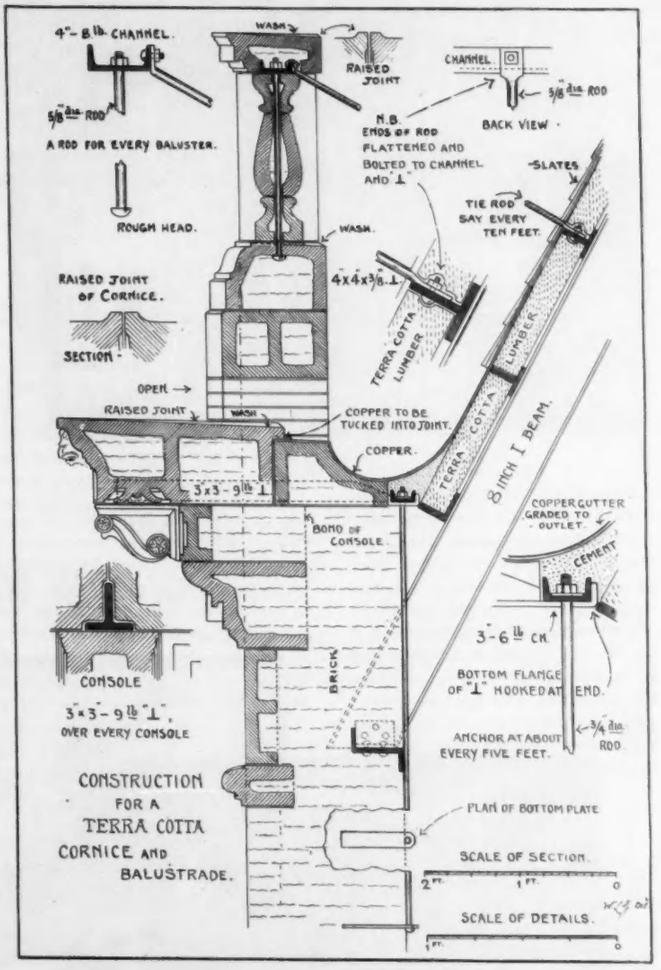


FIG. 62.

The cost of terra-cotta balustrading will depend largely upon the design, and the extent to which it is possible to render its execution simple and direct. A baluster of the shape shown at Fig. 62 should be jointed into three pieces. Not that it is by any means impossible to make such a baluster in a single piece, but, all things considered, it is not worth while to attempt it. To do so, two half balusters are pressed simultaneously, and the soft clay counterparts being brought into contact are united under pressure. When taken from the mold the seams are cleaned off, the imperfections filled in, and, to all appearance, the two are made one. Many of the unions so made are lasting, the two halves cleaving together under the most exacting conditions; but they are not all equally reliable. Some will show signs of dissolution after burning; others, that have passed through that ordeal apparently unscathed, may split from the effects of frost. Then, having to stand on end in the kiln, they are very liable to twist because of the extreme variation in sectional area. When this occurs the only remedy — one that may be resorted to in case of an emergency — is to cut the baluster horizontally, at suitable places, cementing the pieces together again on an iron core. It may as well be conceded that balusters made in one piece are subject to these defects, besides being more expensive in the first instance, with no compensating advantages.

A much better plan is to accept these adverse conditions, providing against the contingencies that arise from them by making the baluster in three pieces at the outset. This will allow each of them to be pressed into the mold from its widest end at one operation, therefore free from the vertical fissures incident to the method previously described. Our present illustration shows a 5/8 in. bolt passing up through the balusters, with head below and nut on top to hold the channel in position; also 5/8 in. staybolts to roof at intervals of 10 ft. Allowing for piers at angles, with intermediate dies in brick or terra-cotta placed at convenient intervals, the channel-bar would in itself afford sufficient lateral stiffness. The diagonal stays to roof being no longer necessary, would then be omitted altogether. We are, therefore, inclined to the opinion that some of the expedients introduced in this example err on the side of superfluous strength. A ½ in. rod as a core for the baluster, one end passing through a bar (or light channel), the other extending down into base in the form of a dowel, is usually sufficient without either head or nut. On this bar the coping is bedded down, and if the rebate in the ends be filled with cement, each piece locks itself and the adjoining pieces so securely that nothing further is required to hold them permanently.

A view of this particular cornice and parapet is given at Fig. 63, which is a residence at Madison Avenue and 39th Street, New York. The first story of the building is limestone, all above that point being terra-cotta and brick. In color the terra-cotta is an exact match for the stone, with brick walling of a somewhat darker

shade. This is a combination that has given much satisfaction here, and may be repeated elsewhere with equally happy results; which is more than can be said for some of the experimental "color schemes" with which we have been made acquainted. Instances of parapet balustrading constructed on the same general lines might be multiplied indefinitely. The present one, however, has been selected merely as a type of the class to which it belongs. Subject to the modifications suggested in the preceding paragraph, the construction does not differ greatly from current practise. Similar methods were adopted in nearly all of the balustrading with which we have been dealing of recent date, and from them there has not, as yet, been any reason to depart. It is likewise encouraging to note, in this connection, that the architectural idea has not succumbed to sordid commercialism, full justice being done to it in design, material, and workmanship. In these respects this building stands out in marked contrast with another corner residence not many blocks distant, in which a much more pretentious frontage is topped out with a painted imitation in sheet metal.

FIG. 63.

With a tier of balusters, a portion of which is shown at Fig. 64, the conditions differ materially from those of last example. They are less than a full circle on plan, with an ashlar engagement which, though usually made separate, may as well be attached. This admits of the two members being pressed at one operation, without horizontal joints, each block representing one baluster and one space. The vertical joint follows the contour of the baluster, and is therefore invisible when the work is assembled. In this method we have two distinct advantages; one contributing to better construction, the other, to a decided saving in the cost of production, and against which there is no offset whatever.

FIG. 64.

Pierced, double-faced balustrading such as shown at Fig. 40 (BRICKBUILDER, October, '97, p. 218), and again at Fig. 60 (BRICKBUILDER, July, '98, p. 143), though not free from inherent difficulty, can be made very successfully, provided the right methods are adopted. In the first place, it should not be cut up into small pieces, but made in sections, and they as large as are at all practicable. The number and location of the joints must depend somewhat on the ratio of voids, and also on the character of the design. In no case, however, should there be more joints than are absolutely necessary, and they should be placed so as to become inconspicuous when pointed. In pressing a piece of this description, a wood (or iron) core is embedded in each of the arms, and the clay built over on all sides of it. The hollow spaces remaining after these cores have been withdrawn allow the moisture to escape during drying, likewise the heat to pass clear through in burning. This makes it possible for the whole block to shrink uniformly, a precaution which goes far to prevent its cracking, or the undue twisting otherwise likely to ensue in the final stages of manufacture.

Some of the pieces in the parapet just referred to were as much as 3 ft. wide, all of them being 3 ft. 7 ins. high, and 8 ins. thick. At Fig. 60 they were 2 ft. 6 ins. each way, and only 5 ins. thick, yet in both instances the full complement was obtained, free from defects of any kind. Reasonable skill in the pressing, coupled with a little extra care in the succeeding stages, was enough to disprove the adverse dictum of certain wiseacres who, having failed themselves, were wont to decry less difficult undertakings as being wholly impracticable.

At Fig. 65 we have a section of balustrading recently made for the parapet of an important public building in which gray terra-cotta, in combination with brick of the same color, is used exclusively above grade level. This perforated panel is rather less than 4 ins. in thickness, a circumstance which adds considerably to the ordinary difficulties of manipulation. Yet more than seventy of these panels were produced without a single failure. The size is 2 ft. 6 ins. by 4 ft. 6 ins. with but one joint, which, passing through the hub vertically, becomes hardly noticeable when pointed.

The cross section of the arms was too small to admit of a core being inserted, as in previous examples; but a 1 in. hole should be bored through the diagonal members before the clay has lost too much of its plasticity. If pressed solid, and allowed to remain so, there will be a disposition to crack which can only be overcome by the exercise of extreme care in the drying. This is due to the difference in shrinkage between a relatively quick drying surface and a slow drying interior. To obviate this we must equalize the evaporation of moisture, and in that way render the shrinkage as nearly uniform as may be. The first expedient that suggests itself here is to ventilate the interior, and so accelerate the escape of moisture; the second, to cover up the exposed surface with damp cloths, or paper, to retard evap-

oration. In this way the natural tendency to crack, which if left to itself would prove fatal, has been controlled with gratifying success.

We have spoken of the drying as though it were a more delicate operation than that of the burning. In work of this kind, with refer-

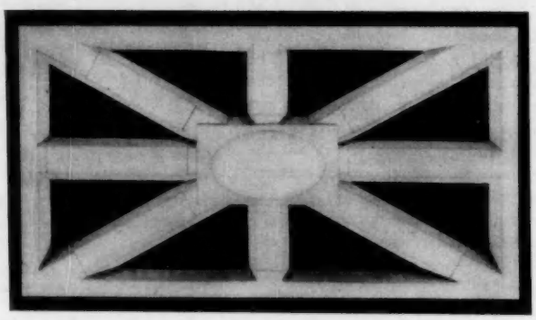


FIG. 65.

ence to freedom from cracking and warping, it certainly is so. Assuming that the chemical constituents of the clay are such as will give the requisite degree of tenacity, also that the clay has been sufficiently ground and pugged, thence delivered to the presser at a uniform consistency, the result then depends chiefly upon the condition in which the unburned pieces reach the kiln. If cracked or warped on going in, they will assuredly be in the same, or a worse, condition when coming out of the kiln; but if the foregoing conditions are favorable, and the pieces free from defects when placed on the bearings, the elements of uncertainty are largely eliminated. It was not always so, as we have good reason to know; but of late years successful firing has come to be looked upon as a matter of course in all well-regulated factories.

Most of the preceding remarks will apply to the panel shown at Fig. 66, the maximum size of which piece would depend somewhat

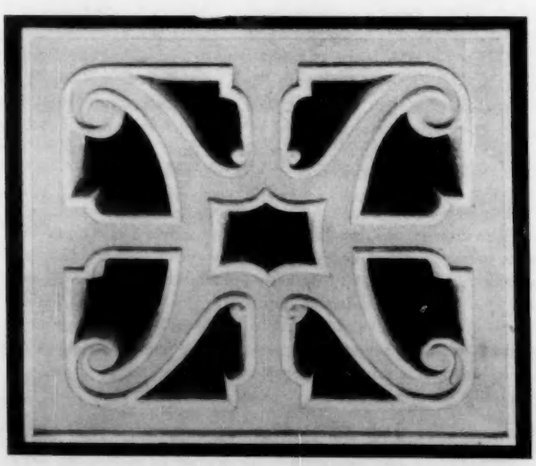


FIG. 66.

on its third dimension. With a thickness of, say, 6 ins., it would be quite practicable up to an approximate size of 3 ft. by 3 ft. 6 ins. In the hands of an architectural designer of average resource, single pieces of balustrading of these dimensions will, we think, be found equal to any possible requirement.

Tensile Tests of Cement.

(*Concluded.*)

BY IRA O. BAKER, PROFESSOR OF CIVIL ENGINEERING, UNIVERSITY OF ILLINOIS.

[Copyrighted.]

Dry Mortar. As a rule, dry mortar is put into the mold by a macnine, although it may be pounded in by hand.

The German standard rules are: "On a metal or thick glass plate five sheets of blotting-paper soaked in water are laid, and on these are placed five molds wetted with water. 250 grams (8.75 ozs.) of cement and 750 grams (26.25 ozs.) of standard sand are weighed, and thoroughly mixed dry in a vessel, then 100 cubic centimeters (100 grams or 35 ozs.) of fresh water are added, and the whole mass thoroughly mixed for five minutes. With the mortar so obtained the molds are at once filled with one filling, so high as to be rounded on top, the mortar being well pressed in. By means of an iron trowel 5 to 8 centimeters (1.96 to 3.14 ins.) wide, 35 centimeters (13.79 ins.) long, and weighing about 250 grams (8.75 ozs.), the projecting mortar is pounded, first gently and from the side, then harder into the molds, until the mortar grows elastic and water flushes to the surface. A pounding of at least one minute is absolutely essential. An additional filling and pounding in of the mortar is not admissible, since the test pieces of the same cement should have the same densities at the different testing stations. The mass projecting over the mold is now cut off with a knife, and the surface smoothed. The mold is carefully taken off and the test piece placed in a box lined with zinc, which is to be provided with a cover, to prevent a non-uniform drying of the test pieces at different temperatures. Twenty-four hours after being made, the test pieces are placed under water, and care must be taken that they remain under water during the whole period of hardening."

The French Commission recommend the following for sand mortars: "Sufficient mortar is gaged at once to make six briquettes, requiring 250 grams of cement and 750 grams of normal sand. The mold is then placed upon a metal plate, and upon top of it is fitted a guide having the same section as the mold, and a height of 125 millimeters (5 ins.). 180 grams of the mortar are introduced and roughly distributed in the mold and guide with a rod. By means of a metallic pestle weighing 1 kilogram, and having a base of the form of the briquette, but of slightly less dimensions, the mortar is pounded, softly at first, then stronger and stronger until a little water escapes under the bottom of the mold. The pestle and guide are then removed and the mortar cut off level with the top of the mold."

The Böhmé hammer apparatus is much used, particularly in Germany. It consists of an arrangement by which the mortar is compacted in the mold by a succession of blows from a hammer weighing 2 kilograms (2.2 lbs.) upon a plunger sliding in a guide placed upon top of the mold. The machine is arranged to lock after striking 150 blows. A high degree of density is thus produced, and more regular results are obtained than by hand. The apparatus is slow.

The Tetmajer apparatus is similar in character to the Böhmé hammer. "It consists of an iron rod carrying a weight upon its lower end, which is raised through a given height and dropped upon the mortar in the mold. The ram weighs 3 kilograms. This machine is used in the Zurich laboratory, and Professor Tetmajer regulates the number of blows by requiring a certain amount of work to be done upon a unit volume of mortar, — 0.3 kilogrammeter of work per gram of dry material of which the mortar is composed. This apparatus is subject to the same limitations in practise as the Böhmé hammer, in being very slow in use, and somewhat expensive in first cost."

STORING THE BRIQUETTES.

It is usual to store the briquettes under a damp cloth or in a moist chamber for twenty-four hours, and then immerse in water at a temperature of 60 to 65 degs. Fahr. For one-day tests, the briquettes are removed from the molds and immersed as soon as they

have begun to set. The volume of water should be at least four times the volume of the immersed briquettes, and the water should be renewed every seven days.

The briquettes should be labeled or numbered to preserve their identity. Neat cement briquettes may be stamped with steel dies, as may also sand briquettes, provided a thin layer of neat cement is spread over one end, in which to stamp the number.

AGE WHEN TESTED.

Since in many cases it is impracticable to extend the tests over a longer time, it has become customary to break the briquettes at one and seven days. This practise, together with a demand for high tensile strength, has led manufacturers to increase the proportion of lime in their cements to the highest possible limit, which brings them near the danger line of unsoundness. A high strength at one or seven days is usually followed by a decrease in strength at twenty-eight days. Steadily increasing strength at long periods is better proof of good quality than high results during the first few days. The German standard tests recognize only breaks at twenty-eight days. The French standard permits, for slow-setting cements, tests at seven and twenty-eight days, and three and six months, and one, two, etc., years; and for rapid-setting cements, from three to twenty-four hours for neat mortar, and twenty-four hours for sand mortars. In all cases the time is counted from the instant of adding the water when mixing the briquette. The briquettes should be tested as soon as taken from the water.

THE TESTING MACHINE.

There are two types in common use. In one, the weight is applied by a stream of shot which runs from a reservoir into a pail suspended at the end of the steelyard arm; when the briquette breaks the arm falls, automatically cutting off the flow of shot. In the other type, a heavy weight is slowly drawn along a graduated beam by a cord wound on a wheel turned by the operator. The first is made by Fairbanks Scale Company, and the second, by Riehle Bros., and also by Tinius Olsen, both of Philadelphia.

Fig. 2 represents a cement-testing machine which can be made by an ordinary mechanic at an expense of only a few dollars.

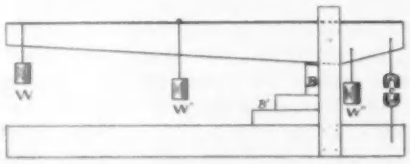


FIG. 2. HOME-MADE CEMENT TESTING MACHINE.
W = fixed weight. W′ = rolling weight. W″ = counterpoise.
B = block for shearing. B′ = block for crushing. C = tension clips.

Although it does not have the conveniences and is not as accurate as the more elaborate machines, it is valuable where the quantity of work will not warrant a more expensive one, and in many cases is amply sufficient. It was devised by F. W. Bruce for use on United States government work at Fort Marion, St. Augustine, Fla.

The machine consists essentially of a counterpoised wooden lever 10 ft. long, working on a horizontal pin between two broad uprights 20 ins. from one end. Along the top of the long arm runs a grooved wheel carrying a weight. The distances from the fulcrum in feet and inches are marked on the surface of the lever. The clamp for holding the briquette for tensile tests is suspended from the short arm, 18 ins. from the fulcrum. Pressure for shearing and compressive stresses is communicated through a loose upright, set under the long arm at any desired distance (generally 6 or 12 ins.) from the fulcrum. The lower clip for tensile strains is fastened to the bed-plate. On this plate the cube to be crushed rests between blocks of wood, and to it is fastened an upright with a square mortise at the proper height for blocks to be sheared. The rail on which the wheel runs is a piece of light T-iron fastened on top of the lever. The pin is iron, and the pinholes are reinforced by iron washers. The clamps are wood, and are fastened by clevis joints to the lever arm and bed-plate respectively. When great stresses are desired, extra weights are hung on the end of the long arm. Pressures of 3,000 lbs. have been developed with this machine.

For detail drawings of a more elaborate home-made cement-testing machine, see *Proceedings Civil Engineers' Club of Philadelphia*, Vol. V., p. 194, or *Engineering News*, Vol. XV., p. 310.

The Clips. The most important part of the testing machine is the clips by means of which the stress is applied to the briquette. (1) The form must be such as to grasp the briquette on four symmetrical surfaces. (2) The surface of contact must be large enough to prevent the briquette from being crushed between the points of contact. (3) The clip must turn without appreciable friction when under stress. (4) The clip must not spread appreciably while subject to the maximum load.

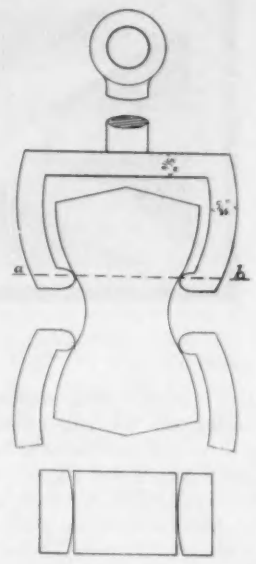


FIG. 3. AMERICAN TENSION CLIPS.

The form of clip recommended by the Committee of the American Society of Civil Engineers is shown in Fig. 3. This form is not entirely satisfactory, since it does not offer sufficient bearing surface, and the briquette is frequently crushed at the point of contact. The difficulty is remedied somewhat by the use of rubber-tipped clips.

The clips and the molds to fit should be purchased of the regular manufacturers, as home-made ones will not give at all satisfactory results.

Whatever the form of the machine or clips, great care should be taken to center the briquette in the machine.

The Speed. The rate at which the stress is applied makes a material difference in the strength. The following data are given by H. Faija, an English authority, as showing the effect of a variation in the speed of applying the stress:—

Rate.	Tensile Strength.
100 pounds in 120 seconds	400 pounds.
100 " " 60 "	415 "
100 " " 30 "	430 "
100 " " 15 "	450 "
100 " " 1 second	493 "

Other experimenters do not get as great differences as above, but all agree that the apparent strength is greater the more rapidly the load is applied.

The French Commission recommends 660 lbs. per minute. The American Society of Civil Engineers recommends 400 lbs. per minute for strong mixtures, and half this speed for weak mixtures. The Canadian Society of Civil Engineers recommends 200 lbs. per minute. The German standard requires "13 lbs. per minute," which refers to the load applied at the end of the steel yard arm and not to the stress on the briquette. Apparently the multiplication of the German machine is thirty, and consequently the rate of stress is 13 x 30 = 390 lbs. per minute.

DATA ON TENSILE STRENGTH.

Owing to the great variation in the manner of making the tests, it is not possible to give any very valuable data on the strength that good cement should show. In 1885 a Committee of the American Society of Civil Engineers recommended the values given in Table I. At least the minimum values there given are required in ordinary specifications, and the maximum values are sometimes employed. Many of the better cements commonly give results above the maximum values in Table I.

TABLE I.

TENSILE STRENGTH OF CEMENT MORTARS.

Age of Mortar When Tested.	Average Tensile Strength in Pounds per Square Inch.			
	Portland.		Natural.	
CLEAR CEMENT.	Min.	Max.	Min.	Max.
1 day—1 hour, or until set, in air, the remainder of the time in water	100	140	40	80
1 week—1 day in air, the remainder of the time in water	250	550	60	100
4 weeks—1 day in air, the remainder of the time in water	350	700	100	150
1 year—1 day in air, the remainder of the time in water	450	800	300	400
1 PART CEMENT TO 1 PART SAND.				
1 week—1 day in air, the remainder of the time in water	...	...	30	50
4 weeks—1 day in air, the remainder of the time in water	...	..	50	80
1 year—1 day in air, the remainder of the time in water	...	...	200	300
1 PART CEMENT TO 3 PARTS SAND.				
1 week—1 day in air, the remainder of the time in water	80	125	...	...
4 weeks—1 day in air, the remainder of the time in water	100	200	...	...
1 year—1 day in air, the remainder of the time in water	200	350	...	...

Natural cement, neat plastic mortar, will generally show 50 to 75 lbs. per square inch in seven days, and 100 to 200 lbs. in twenty-eight days. Good Portland cement, neat plastic mortar, will show 100 to 200 lbs. per square inch in one day, 400 to 600 in seven days, and 600 to 800 in twenty-eight days. With 3 parts sand, Portland cement, plastic mortar, will give at least 100 lbs. per square inch in seven days, and 200 in twenty-eight days. Of course the strength varies greatly with the method of testing. In consulting authorities on this subject, it should be borne in mind that the strength of cement, particularly Portland, has greatly increased in the past ten years. The specifications should be drawn to correspond with the personal equation of the one who is to test the cement.

The German standard requirement for dry mortar pounded into the molds is 227 lbs. per square inch at twenty-eight days.

EQUATING THE RESULTS.

It not infrequently occurs that several samples of cement are submitted, and it is required to determine which is the most economical. If the cement is tested with the proportion of sand usually employed in practise, then only strength and cost need to be considered; but if the cement is tested neat, then cost, strength, and fineness must be taken into account. Table II. shows the method of deducing the relative economy when the cement is tested with sand. The data are from actual practise. In a similar manner, results could be deduced for the relative economy at any other age. The circumstances under which the cement is to be used should determine the age for which the comparison should be made.

TABLE II.

RELATIVE ECONOMY OF CEMENTS TESTED WITH SAND AT 7 DAYS.

Cements.	Tensile Strength, 1 C. to 3 S.		Cheapness.		Relative Economy.	
	Pounds per Square Inch.	Relative.	Cost per Barrel.	Relative.	Product of Relative Strength and Relative Cost.	Rank.
A	168	95.4	$2.30	100.0	95.40	2
B	176	100.0	2.34	98.3	98.30	1
C	166	94.3	2 40	95.8	90.33	3
D	135	76.7	2 45	93.8	71.94	4
E	135	76.7	2.47	93.1	71.40	5

However, this principle should be employed with caution, particularly with short-time tests, since the method gives the advantage to a cement which gains its strength rapidly and which may therefore be unsound. If this method is employed, care should be taken that the minimum strength specified is not unduly low.

Fire-proofing.

A CONSENSUS OF OPINION AMONG LEADING ARCHITECTS OF CHICAGO ON THE USE OF BURNED CLAY FOR FIRE-PROOF BUILDINGS.

(*Concluded.*)

IN the last issue of THE BRICKBUILDER we published the results of interviews with some of the leading Chicago architects in regard to the use of burnt clay for fire-proofing purposes. Reports of further interviews are published herewith. In order to bring again before our readers the distinct lines upon which the inquiries were based, we reprint the questions to which reference is made in the interviews. These questions cover the whole field of our proposed inquiry, and a comparison of the replies suggested thereby shows how firm is the belief in burnt clay as a medium for fire-proof construction and how thoroughly this material has been able to accomplish the desired results. These interviews, as compared with the opinions we published some time since of some of our leading Eastern architects, show that the use and appreciation of terra-cotta does not materially differ in the West from what is recognized as the best practise in the East.—ED.

The following questions were submitted to those whose names appear hereafter:—

1. Do you employ burned clay in fire-proof buildings, and if so to what extent?

2. Do you prefer it to other so-called fire-proofing systems, and if so for what reasons?

3. What kind of burned-clay material do you prefer? or would you employ different kinds for different purposes?

4. Have the recent attacks on the burned-clay systems of fire-proofing by promoters of other systems influenced your judgment?

5. Do you think that the makers of burned-clay fire-proofing are trying to improve and perfect their material and its method of application?

6. What do you think is the lesson to be learned from recent fires in buildings fire-proofed with burned clay?

7. Do you think it right for architects to consent to their clients always taking the lowest bid for this kind of work without regard to the differences in what the parties intend to furnish?

8. What do you think is the reason why the price and quality of burned-clay fire-proofing have been reduced during the last ten years?

9. Do you agree with the opinions given by Mr. Jenney in the July BRICKBUILDER?

10. Do you think it desirable for architects to employ fire-proofing experts to design the details of fire-proof work and supervise its erection, as is now done in the case of steel constructions?

Louis H. Sullivan, formerly of the firm of Adler & Sullivan, has had a large experience in the erection of fire-proof buildings, not only in Chicago, but in St. Louis, Buffalo, New York, and other cities. He said: "Yes, I have used burned clay largely, and in nearly all of the fire-proof buildings that I have designed. I prefer it to other so-called fire-proof materials, because it is, on the whole, better adapted to the contingencies of building construction. It is best adapted to winter building and rapid work; in fact it is unwise to employ plastic methods for large buildings, even though it is proposed to do this part of the work in summer, for contingencies might arise to compel part of it to be done in freezing weather, when no dependence could be placed upon the results. The use of plasters and concretes in solid bodies demands practically laboratory conditions and constant inspection, and further, it is for these reasons also that I agree with Mr. Jenney that it is best for filling over flat arches to use as little concrete and as much tile as possible, and, when concrete is necessary, to make it as he suggests. I prefer porous to hard tile, but I would prefer a semi-porous tile to either, if I could get it, because it has great strength and is less liable than hard tile to

crack when suddenly cooled by water. I wish some manufacturer would put such a material on the market in this city. I have heard of its having being used elsewhere."

In answer to the fourth question, Mr. Sullivan said emphatically "No," which requires no enlargement or explanation of his views on that subject. In answer to question five he said: "In the West, that is including Buffalo and Pittsburgh and points west of those, yes; east of those points, no. The Eastern tile seems to be the same that it was years ago, very rough and uneven, both in form and quality. I very much dislike the Eastern system of making a soffit tile out of an extension of the skew-back carried under the beam on both sides. In recent work done under my direction in New York, many of these extensions were broken off in setting. They did not fully cover the space under the beams, and I required the contractors to use mortar combined with a reinforcement of metal buried within it, to supply the deficiency. But I do not like this as well as the independent soffit tile with an air space." Referring to Mr. Jenney's girder system as used in the extension to the New York Life Building at Chicago, and illustrated in the July BRICKBUILDER, he said: "I like it. It is a very simple and strong system of construction so far as the steel is concerned, and capable of thorough fire-proofing, so as to make flat ceilings throughout without disclosing the girders." In answer to the question, "What do you think is the lesson to be learned from recent fires in Pittsburgh, where the steel structure was saved though the fire-proofing was considerably damaged?" he said that the work was imperfect, but could, with slight improvement, have been made thoroughly reliable. "The lesson is that all fire-proofing is worthless unless thoroughly done."

In answer to question seven he said: "That is a good question that applies to everything, no matter what it is. I cannot control the commercial instincts of my clients, but try to do it."

In answer to question eight, he thought that the price and quality of burned-clay fire-proofing had been reduced during the last few years, because of the stringency of the money market and severe competition for contracts. As to whether or not he agreed with the opinions given by Mr. Jenney in the July BRICKBUILDER, he said: "In the main I do, yes." Mr. Sullivan is preparing to finish all the columns in a large store he is now designing for Chicago, to a round section, and to avoid sharp angles wherever possible.

During the absence of Henry Ives Cobb, in Washington, Christian A. Eckstorm, the manager of his offices, consented to give his own views, which he thought would reflect those of Mr. Cobb. In answer to the first question he said: "Entirely; except in one building now being erected (one of the Chicago University buildings), where we are using Makolite lintels between the floor beams in place of flat arches, but this has been done entirely for economic reasons, and not because we preferred them.

To question two he said, evidently referring to interior work: "Yes; and for one reason, that less depends upon the character of workmanship in putting up. That is not to say that we admit inferior work, if we can help it, but with setting hollow-tile fire-proofing the chances of getting inferior workmanship are less than with other materials and methods. For instance, in winter work and rapid construction the advantages are all with hollow tile.

In answer to question three he said: "We have used the hard-burned tile in all but two buildings. We used porous tile in the Chicago Athletic Club, which you know was severely tested by fire during construction, and when the protecting material was not in sufficiently complete condition to do its work as effectively as if the building had been finished, and also in the Chemical Building in St. Louis. That used in the latter was made at St. Louis. It was of about the same consistency as the Chicago porous tile, but the pieces had thicker webs than the Chicago make. I tried the heat and water test on it with satisfactory results."

To question four his answer was "No." To question five he said: "Not within the last three or four years. The Pioneer Fire-proof Construction Company, of Chicago, are now proposing to furnish hollow-tile lintels for floor construction to reach from beam to beam, in place of end-pressure arches, which will do away with the expense of centering, and I think it may reduce the cost of setting, though perhaps the tile may cost more."

In answer to question six he said: "I can speak only from our own experience. After the fire which attacked the Chicago Athletic Club, before completion, which was the only actual test ever given to any of our buildings, we removed some pieces of steel which seemed to have been most exposed to fire and had them tested exactly the same as new steel, and found that they had not been depreciated in any respect."

To question seven he said: "No. It is against the practise of this office to let work to the lowest bidder regardless of difference of material offered." He thought that competition and the stringency in the money market were the reasons why the price and quality of burned-clay fire-proofing had been reduced during the last ten years, and added, "It must be admitted that too many people are unwilling to pay for a good article when they can get a cheaper one which seems to answer the purpose." He had not sufficiently examined Mr. Jenney's article to give a definite answer, but in answer to question ten said: "Yes, it would be desirable for architects to employ fire-proofing experts, as is now done in the case of steel constructions."

N. Clifford Ricker, head professor of the Department of Architecture in the University of Illinois, and Dean of the Engineering Faculty, while not a Chicago architect, has always been in practise, and has not only had experience in the use of fire-proof materials, but has been a keen observer of the works of others, so that their experience has had an influence in shaping the course of instruction in practical construction at the University. THE BRICKBUILDER is glad to be able to add the expression of his analytical judgment to the opinions of more active practitioners. Taking the questions *seriatim* for his text, he said: —

"1. Since nearly all my buildings have not been required to be fire-proof, I have seldom had occasion to employ burned clay for fire-proofing.

"2. I certainly consider hollow burned-clay tiles for floors, partitions, and external walls to be more durable than any other fire-proofing materials for these purposes. With proper supervision and careful construction, the safe strength of floors may be computed with greater certainty; burned clay resists water, fire, and dampness more efficiently than any other system with which I am acquainted. The expanded-metal-concrete system was employed in the Library Building of the University because somewhat cheaper, thus obviating the necessity of reducing the size of the building.

"3. I should prefer to use fire-clay products for fire-proofing, though porous terra-cotta might be as efficient, though weaker.

"4. Not at all.

"5. This is doubtless the case, and would be the natural result of experience and competition.

"6. That this is the most efficient fire-proofing material used, if buildings are properly designed, so long as it is impossible to construct them entirely of brick masonry.

"7. No more than for any other kind of work. The advice of the architect to his client should be based on the greatest permanent or ultimate benefit to him.

"8. Results of experience, discoveries of new deposits of materials and new processes of manufacture, increased product, economies in management, competition in manufacturing and application, invention of new forms of finished products.

"9. Generally, although it is probable that failure of burned-clay fire-proofing to resist fire and water is due more to defective fixing and attachment, than to quality of material. It will not always be true economy to drop ceiling to bottom of girder, except perhaps in large rooms. Cinder concrete is lighter and cheaper, but is inferior to concrete of cement, sand, and gravel. No doubt plastering may still be greatly improved and made to resist fire and water without material injury.

"10. This will doubtless become necessary in case of a very important structure."

Masons' Department.

ESTIMATING BRICKWORK.

(Concluded.)

BY F. E. KIDDER.

IN any system or method of estimating there is necessarily a certain amount of guess-work involved as to the labor that will be required, and to some extent in regard to the materials, and the ideal system is that which most nearly eliminates this feature. In figuring by the method explained in the previous article, the contractor must, to a greater or less degree, guess at the price per thousand wall measure to use as a basis in making up his bid. True, if he has built similar buildings in the same locality and kept an accurate account of the cost, he can come very close in his guessing, but when the building has an unusual amount of openings, or has towers, or an elaborate brick cornice, or other special features, this method of estimating involves a good deal of guess-work. Again, a rise in price of one or more of the materials required, or in wages, will affect the rate per thousand, but not in the proportion that it bears to the article affected. To figure a job close, therefore, the writer is of the opinion that the quantities of all of the materials required should be estimated, and then the cost of the different items, including labor.

If part of the work is more difficult than another part, the labor on the two parts may be figured separately. The actual cost of the materials can be pretty closely estimated, the labor being the most variable item.

To separate the different items takes a little more time, it is true, than the method of figuring by the thousand, and requires more data, but one cannot expect to make a success of any business without putting a good deal of intelligence into it. The writer believes that one reason why the average contractor does not succeed better is that he is so careless in keeping accounts of the cost of the work that he does and the quantities of materials used.

Ask half a dozen brick contractors how much lime and sand it takes to lay 1,000 common bricks, and nearly as many different answers will be received, and few contractors can tell just what it cost per thousand to lay the bricks in any particular building. All of these points should be carefully determined at the end of every job, and the results itemized and recorded for future use. This will not only enable the contractor to figure more closely, but may enable him to discover leaks in his business.

The following data relating to a building built about a year ago, in Denver, was obtained from the contractor and is given to illustrate the way in which some of the items may be determined, although the relative amount of labor, lime, and sand for the pressed bricks was not kept separately on this job. The building was an ordinary two-story brick residence, 29 by 48 ft., with stone foundation walls and faced with pressed brick on all four sides; the walls were 12 ins. thick from foundation to wall plate.

Several contractors figured on the job, and their estimates varied but little from 93,000 brick, solid wall measure. There were 2,900 superficial feet of pressed brickwork, after deducting openings.

The writer figures that there are 2,426 cu. ft. of common brickwork, after deducting for all openings, and allowing nothing for the chimneys above the roof, as they were built of pressed bricks. There was no fancy brickwork.

The materials actually used in this building, and their cost, are as follows: —

18,300 pressed bricks, at $14.25, delivered	$260.75
42,000 common bricks, at 4.00, "	168.00
75 bushels of lime, at 46 cts.	34.50
21 loads of sand (about 1½ yards to load), at 60 cts.	12.60
2 bbls. mineral red (for red mortar)	10.00
Labor	202.50
	$688.35

This job, therefore, ran at the rate of 6⅓ pressed bricks to the square foot, after deducting openings, and the total number of bricks was a little less than two thirds of the wall measure.

It also took 17.3 common bricks to the cubic foot of actual brickwork.

Estimating as closely as possible the cost of the pressed bricks and the materials and labor required for laying them, and deducting from the total cost, we find that the 42,000 common bricks cost $315.18 laid in the wall, or $7.50 per thousand; the lime, sand, and labor costing $3.50 per thousand. Or, deducting the actual cost of the pressed bricks, without laying, and dividing by 93,000, we find that the work was done for $4.60 per thousand, wall measure. The wages paid on this job were $2.50 per day of eight hours, for bricklayers, and $2 per day for laborers. The masons lay the pressed bricks from the inside, and each man always backs up his pressed brick. The cost of laying the pressed brick, including lime and sand, was $6.15 per thousand.

The prices quoted above are extremely low, and probably cannot be duplicated elsewhere, but the quantities should run about the same in all localities.

For estimating brickwork in Denver, the writer finds that the following data is quite close for the average job: —

Pressed brick per net square foot, 6⅓.

Actual bricks required (pressed and common) two thirds wall measure.

Actual number of bricks to the cubic foot of common brickwork, after deducting openings, and calling a 13 in. wall 12 ins. thick, 17⅔.

A brick mason will lay 800 pressed bricks, or from 1,500 to 1,600 common bricks, on an average in a day of twelve hours.

To lay 1,000 common bricks (kiln count) requires 1½ bushels of white lime (80 lbs. to the bushel, or 2½ bushels to the barrel), and ⅓ yard of sand.

To lay 1,000 pressed bricks will require ¾ bushel of lime and ¼ yard of sand; and if colored mortar is used, about 50 cts. per thousand should be allowed for the coloring matter.

With wages at $3 per day for masons, and $2 per day for labor, the cost of labor per thousand bricks will be about $6.25 for pressed bricks and $3.33⅓ for common bricks.

Taking these figures as a basis, then, the writer would figure a job of brickwork as follows: —

2,493 sq. ft. (net) pressed brick at 6⅓ = 15,789 pressed bricks.

1,945 cu. ft. of common brickwork at 17⅔ bricks per ft. = 34,360.

15,800 pressed bricks at $15 per thousand, delivered	= $237.00
34,400 common bricks at $4.50 per thousand, delivered	= 154.80
Lime for 15,800 pressed bricks, 12 bushels.	
" 34,400 common bricks, 51½ "	
63½ bushels at 46 cts.	= 29.21
Sand for 15,800 pressed bricks, 4 yards.	
" 34,400 common bricks, 21½ "	
25½ yards at 55 cts.	= 14.02
Mortar color, 15,800 bricks, at 50 cts. per thousand	7.90
Labor, 15,800 pressed bricks, at $6.25	98.75
" 34,400 common bricks, at $3.33⅓	114.66
Extra for laying 2,000 bricks in cornice	8.00
200 molded bricks, at 4 cts.	8.00
3 iron ash doors, at $1.75	5.25
Thimbles	1.00
Flue lining, 32 ft. at 25 cts.	8.00
Cleaning down and pointing	25.00
Total	$711.59
Add for profit and contingencies	70.00
Amount of bid	$781.59

As prices and methods of working vary in different localities, the contractor must, of course, determine the various prices for the different items, for himself, and when each job is completed, he should sum up from his bills and time-book the actual materials used and the cost of labor, and compare with his bid, and in a short time he can estimate very closely indeed.

Many Denver contractors now estimate in this way, except that they determine the number of common bricks by first computing the solid wall measure, and taking a certain proportion of this for the actual number of both common and pressed bricks. Thus, if the job figured, say, 72,000 brick wall measure, they would allow about one third, or 24,000 bricks for openings, and difference between 22½ and 17⅔, which would leave 48,000 bricks, kiln count. Subtracting from this the pressed bricks gives the number of common bricks. Having determined the number of bricks, the bid is made up in the foregoing manner. There is an advantage in this method, that the contractor knows just about what he has got to pay for materials where he is doing part of the work himself.

The writer would suggest that contractors might help each other by furnishing for publication in this column data along the lines above indicated, taken from their accounts. Such data would certainly be interesting to all and of great value.

MIXING CONCRETE BY GRAVITATION.

CONCRETE has generally been mixed in two ways, either by hand with a shovel or by steam machine mixers. The advantages of the different ways of mixing concrete are too well known to be spoken of here but briefly. The three principal advantages of mixing concrete with steam machines are economy of cost, thorough mixing, and reducing the time of mixing to a point where the full advantage of the initial set of the cement is obtained. Concrete can be mixed with shovels by hand thoroughly if the proper amount of care and time is taken, but it takes so long to mix a batch of concrete by hand that many of the quick-setting cements began their initial set before the concrete is deposited in place.

Until recently there has not been, to our knowledge, a machine on the market costing less than several hundred dollars that could mix all the concrete that four men could shovel into it, and without taking up considerable room for the mixer and the boiler for furnishing steam, and without the expense of a skilled workman to handle the boiler and the engine of the mixer.

We have recently seen in Boston a concrete mixer consisting of a trough about 10 ft. long with a hopper at the top into which the stone, sand, and cement are thrown and with an arrangement of pins from one end to the other, and with a stream of water entering the mixer approximately half way down its length, which will give exactly the same process and result as mixing by hand, *i. e.*, the broken stone or gravel, sand, and cement are thoroughly mixed dry by striking a large number of pins in the upper half of the mixer and then coming in contact with the jet of water are thoroughly mixed wet through the rest of the mixer, coming out at the lower end into a wheelbarrow, bucket, or other suitable apparatus for conveying it to the desired place. The advantages of this mixer are self-evident. The concrete is mixed precisely as it is by hand or with the steam machine by being mixed thoroughly dry and then mixed again thoroughly after it is wet; and as the only power required is gravitation, there is no cost for power, fuel, or a skilled man to operate it. This machine is made so light that three or four men could lift it up and set it in place without the use of rollers, skids, or derricks. The cost of transportation and setting up the mixer is nominal.

This mixer can be used not only on large jobs where a thoroughly first-class concrete is desired in large quantities, but it can also be set up on small jobs where the cost of teaming a mixer, engine, and setting up would cost nearly as much as the labor to mix the concrete by hand.

EXTERIOR SCAFFOLDING.

THE custom in regard to scaffolding for the erection of the exterior of buildings differs in various parts of the country. In New England it is usual to erect an outside staging constructed usually of 4 by 4 uprights spaced 6 or 8 ft. apart, in double rows, and connected and braced by 6 in. boards, the scaffolding being carried to the top of the building. In New York more commonly the scaffolding is projected on putlogs, from story to story or the work of laying the face brick, etc., is done from each floor.

The question of which is the best is largely a matter of usage, but there is one way of looking at it which we think is worthy of consideration. If the building is anything more than the plainest kind of commercial structure, the architect likes to study it as it goes along. If the outside of the building is covered with staging from top to bottom, it is like working a typewriter which letters upside down. You cannot see what is being done until perhaps it is too late to make any change. On the other hand, if the staging covers only one story at a time, any imperfection, irregularity, or undesirable combination can be seen at once from the outside in its true proportions and full effect and can then be altered or remedied before the building is carried any higher.

It is the fond belief of New England contractors that they get better bricklaying in and around Boston than anywhere else in the country. We doubt if our New York brethren would quite agree to that; at any rate, we hardly believe that the alleged superiority is due entirely to the fact that outside stagings are used here. Certainly the opportunity of watching the building as it goes along is something that would be welcomed by every architect, and we all know how anxiously at times we have waited for the final removal of the staging, often in serious doubt as to whether this pet scheme of color or that detail would have its true effect, and we certainly should advise inside staging in every case where it is possible, in order to study the building as it goes along.

ELECTRIC CONDITION OF MODERN BUILDINGS.

THERE have been several paragraphs in some of the technical journals, which have been frequently repeated in the dailies, calling attention to the possibilities of destructive action by electrolysis, or by some possible but even more obscure process due to what is vaguely termed free electricity, which is supposed in some way to escape into the frame of a structure and work havoc with all its knuckles and joints.

No less an authority than General Sooy Smith has stated a belief that this is a tangible source of danger to the steel frames of the huge Chicago buildings.

If this is a danger, which is truly imminent, it certainly ought to be carefully considered and guarded against, and yet we can hardly believe that the amount of electricity which gets into the frame of a modern building is ever sufficient in amount to be even appreciable.

If electricity were in the habit of wandering around in the eccentric manner which sometimes characterizes the lightning flash, there might be more reason to fear for its action on the frame of a building; but no such eccentricity is habitually observed in any structure with which we have ever been familiar. In our Boston Subway, which is constructed with steel columns at the sides, and overhead steel beams, the possibility of electricity leaking from the overhead conductor to the overhead beams, thence to the columns and through the earth to the return conductor, is perfectly plausible, and, indeed, we are inclined to believe will in time present a real source of danger to the structure; but no such arrangement of conductors is ever met with in a commercial building, and we cannot believe that there is the slightest danger of electricity playing any such pranks with our steel frames as to endanger to any appreciable extent the security of its parts.

Brick and Terra-Cotta Work In American Cities, and Manufacturers' Department.

NEW YORK.—This is a period of transition and preparation in the real-estate and building world. Once fairly started on its course in September, business in ordinary years is likely to travel along prosperously and without serious interruption until the Christmas holidays, only the possibility of an unsound election being sufficient to make it pause in the late autumn. This year, fortunately, there is no issue in sight that is calculated to destroy confidence or upset the financial world, the only danger in that line at present being the remote possibility of a free silver victory in the Congressional elections — a possibility so remote that it may be dismissed without a thought.

It would seem, therefore, that we are to enter upon a season of steady business. It is true that the business of the past month has not even given a hint of coming activity, nevertheless the conditions are now right and we hear expressions of confidence on all sides. A feature that should not be lost sight of, and which is sure to be an improving factor, is the radical change that is coming to the transit facilities of the city within the next few months. I refer particularly to the near completion of the under trolleys on Sixth and Eighth Avenues. This will greatly help the outlying districts and the suburban towns, for in the long run it is accessibility that tells. Old New Yorkers may have their preferences and their prejudices, but to the newcomer the advantage of a single fare from his house to the City Hall is almost decisive when he selects his home.

We are no nearer to the possibility of having our great Public Library than when we last referred to the matter, owing to the economy of the present administration and the necessity for placing street lamps 10 ft. apart throughout all the adjacent corn fields, which act we of course do not criticize, as it is probably a charitable act to assist some starving contractor.

ST. JAMES HALL, PHILADELPHIA, PA.
Rankin & Kellogg, Architects.

TERRA-COTTA DETAIL, PRESS BUILDING, 7TH AND SANSOM STREETS, PHILADELPHIA, PA.
Executed by the Standard Terra-Cotta Company.
T. P. Chandler, Architect.

Among the few items of new work reported last month are:—

Charles C. Haight, architect, has prepared plans for a two-story brick warehouse to be built for the Trinity Church Corporation at a cost of $30,000.

George F. Pelham, architect, has planned a six-story brick store and loft building to be built at numbers 203, 205 Wooster Street; cost, $30,000.

Franklin Bayliss, architect, has planned a six-story brick mercantile building to be built on Prince Street, corner West Broadway; cost, $40,000.

Alexander M. Welch, architect, is preparing plans for three five-story brick flats to be erected on Riverside Drive near 87th Street; cost, $100,000.

I. G. Perry, State Architect, Albany, N. Y., has prepared plans for a three-story brick hospital building to be erected on Ward's Island; cost, $150,000.

PITTSBURGH. The expectation among architects during the spring and summer has been that when the war was over building operations would improve rapidly; but peace, which now seems assured, has come so late in the season that little improvement is looked for before the first of the year. While work of any importance is practically at a standstill, a great deal of small work is being done. This is principally small dwellings costing from $3,000 to $10,000; many are doubtless taking advantage of low prices and building homes for themselves, but the large number of them, and especially the fact that so many are going up in groups of from three to six or more, would seem to show that the high rents obtained here have attracted investors, and particularly those who have only a small ready capital, who see here an opportunity for obtaining a good return from their investments. When we remember that a house costing about $5,000 will rent for $50 a month, it seems that they are receiving at least a fair percentage.

A noticeable fact here has always been the almost complete absence of apartment buildings and of flats, but this has also lately been receiving more attention. The new Schenley Apartments on Fifth Avenue, East End, will supply, for a time at least, the demand for a high-priced building, and a number of moderate

priced ones are now being put up or will be commenced soon, while several are being contemplated but are not far enough along to give particulars.

Rutan & Russell have recently let the contract for the new Edgeworth Club House to be built at Edgeworth, Pa.

Work has been commenced on the new building for the United Presbyterian Seminary Building in Allegheny. It is to be of brick and terra-cotta, and to cost $90,000. Struthers & Hannah are the architects. This firm is also preparing plans for an addition to the residence of Charles Lockhard, Highland Avenue, to cost about $45,000.

Alden & Harlow have prepared plans for a summer home for

CHEMICAL BUILDING, ST. LOUIS, MO.
The front brick used in this building was manufactured by the Illinois Supply and Construction Company.

Mr. Sol Smith Russell; it is to be built at Edgartown, Mass., and to cost $10,000.

Geo. S. Orth & Bros. are at work on a new house for Dr. Halleck, to cost about $12,000.

A new six-story apartment house to be built at Friendship Park has been planned by Architect De Arment.

Miss Mercur has planned the St. Francis de Sales Roman Catholic Church at McKee's Rocks; it is to be built of brick, and cost $40,000. She has also prepared plans for a new building for the Young Women's Seminary at Washington, Pa; cost, $25,000.

The Diamond National Bank has opened a competition for a new office and bank building, which they will erect next spring. T. D. Scott is the only local architect at work on this.

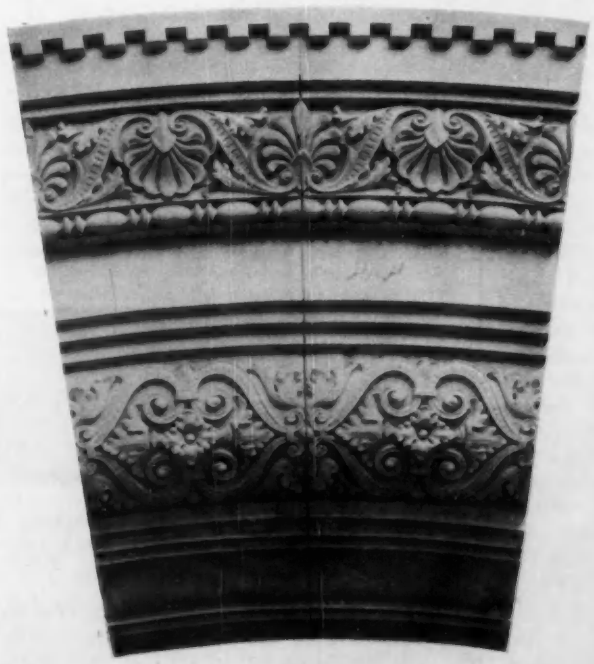
J. D. McShane will erect an apartment house on Highland Avenue. It is to be built of Roman brick and terra-cotta, and cost $100,000. Topp & Craig are the architects.

TERRA-COTTA CAP FOR SCHOOL NO. 7, BAYONNE, N. J.
Executed by the New Jersey Terra-Cotta Company.
Hugh Roberts, Architect.

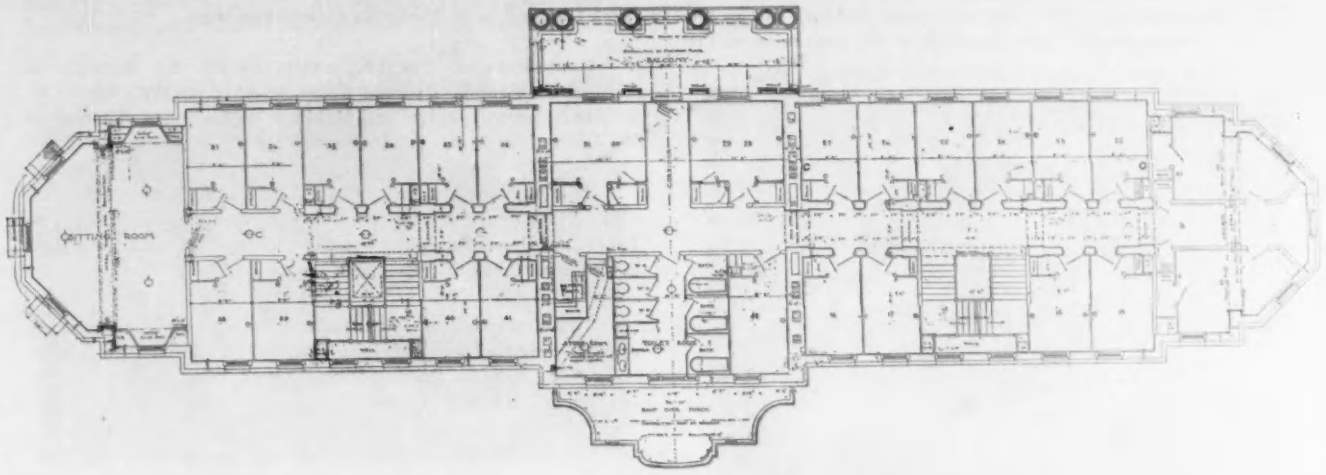
Great preparations are being made for decorating the city during the triennial conclave of the Knights Templars, which will be held here next month. Many large arches are being planned, to be built of staff. It is to be hoped that, with a material which lends itself so readily to work of such a character, they will surpass in design and artistic merit the arches ordinarily built on such occasions.

NEW TRADE PUBLICATION.

THE CONKLING, ARMSTRONG TERRA-COTTA COMPANY has published an attractive portfolio containing photographic reproductions of work executed by them, including general views of buildings, and carefully selected details. We have heard of an astute individual who undertook to collect an epitome of modern American architecture in the shape of the annual trade catalogues of the art industries. These really constitute a by no means bad measure of progress, and certainly in such a collection the representation of this company could be given a high place. Few of the art industries can show so entertaining a lot of really excellent work both in design and execution, and the terra-cotta which is shown by this portfolio of some seventy-eight plates is of a character which marks the publication as more than a mere trade catalogue. It has been a pleasure to illustrate some of the work of this company from time to time in these



TERRA-COTTA DETAIL, DOYLESTOWN BANK, DOYLESTOWN, PA.
Executed by the Conkling, Armstrong Terra-Cotta Company.
Baker & Dallett, Architects.



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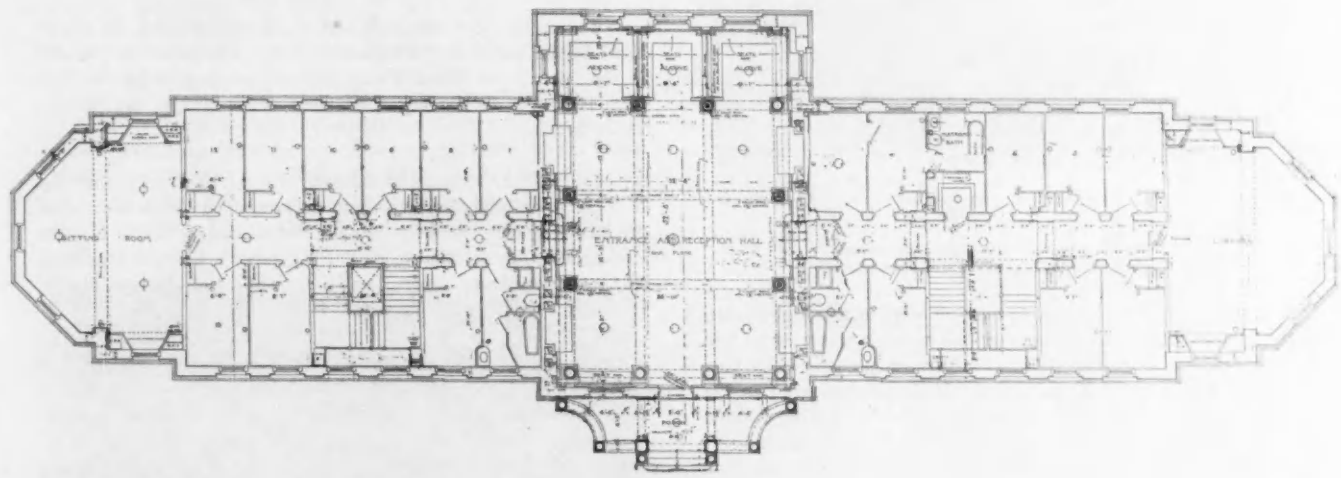

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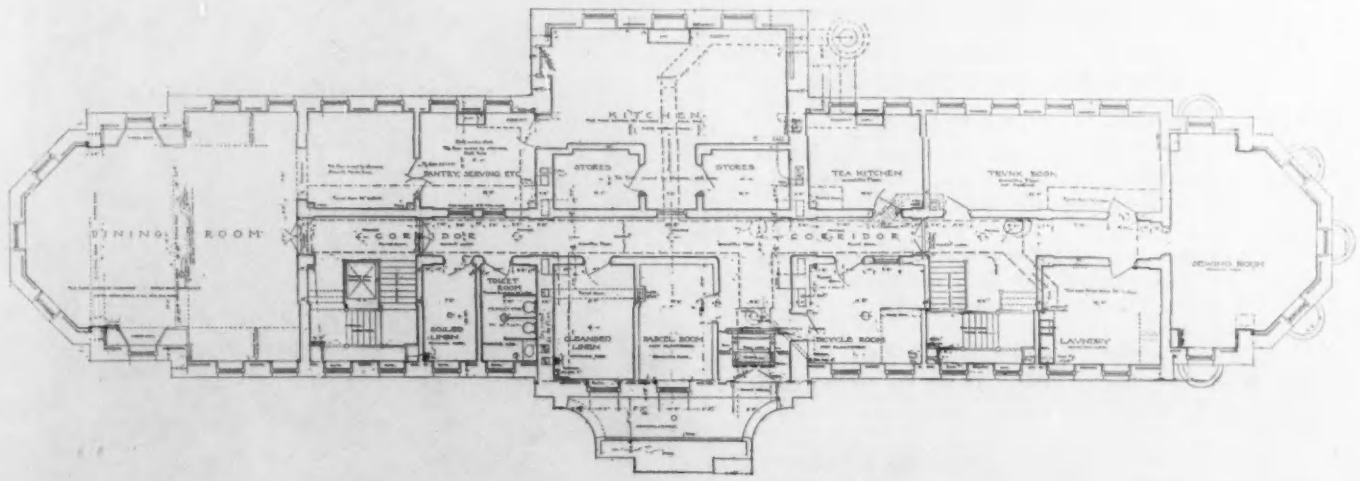


BASEMENT.

CITY HOSPITAL, BOSTON. THE ANN WHITE VOSE BUILDING. DWELLING FOR NURSES.
Wheelwright & Haven, Architects.

columns, and the company has been fortunate in having opportunities of executing some of the best work which has been put on the market. The company is also fortunate in the possession of the

FINIAL OVER MAIN ENTRANCE, BAYARD BUILDING, NEW YORK CITY.
Executed by the Perth Amboy Terra-Cotta Company.
Louis H. Sullivan, Lyndon P. Smith, Architects.

artistic mechanics who are able to turn out work of this high character; and now it is the architectural public which is fortunate in having these various fragments collected in permanent shape where they can be, perhaps, more fully appreciated in detail than even in the building itself. We suppose that in common with every large manufacturer of terra-cotta the Conkling, Armstrong Company is not always allowed to do its best, that some of its terra-cotta is necessarily of the nature of pot-boilers which it would not care to illustrate, but the selection manifested in this catalogue shows the possession of a degree of good taste which argues well for the cooperation the architect may expect who looks to them for the artistic execution of his ideas.

CURRENT ITEMS OF INTEREST.

POWHATAN cream-white bricks have been specified for fronts of three flats and store buildings, East Broadway, Clinton, and Division Streets, New York City.

THE DAGUS CLAY MANUFACTURING COMPANY is supplying buff and fire-flashed brick for a new block at Philadelphia for which John Anderson is architect.

GABRIEL & SCHALL report increasing sales of their Precipitated Carbonate of Barytes among the leading clay-workers of the country.

THE ILLINOIS SUPPLY AND CONSTRUCTION COMPANY have rebuilt entirely of brick their plant recently destroyed by fire, and began on the fifteenth of the month the execution of several new orders.

THE Chesebrough Building, an eleven-story structure now being erected at Pearl and State Streets, fronting Battery Park, New York City, will be of Powhatan cream-white brick.

SANDERSON & PORTER, contractors for the Meriden & Compounce Electric Railroad Company, have let the contract for furnishing several bridges and buildings on the line of this road to the Berlin Iron Bridge Company, of East Berlin, Conn.

THE KITTANNING BRICK AND FIRE-CLAY COMPANY are furnishing interior linings for the Toombs, New York City, and Collins Farm Hospital, Collins, N. Y., also exterior brick for school buildings at Brookville, Pa., and Corry, Pa.

THE DAGUS CLAY MANUFACTURING COMPANY is supplying through their Buffalo agent, John H. Black, the fire-flashed Roman brick being used in the new Park Theater, Niagara Falls, N. Y., Orchard & Joralemon, architects.

JOHN H. BLACK, representing the Kittanning Brick and Fire-Clay Company, at Buffalo, is supplying the buff bricks being used in the addition to the Collins Farm Hospital, Collins, N. Y., Aug. C. Essenwein, architect.

THREE hundred thousand buff Norman face bricks, manufactured by the Kittanning Brick and Fire-Clay Company, will be used in the new Third Ward Public School Building, Allegheny, Pa. This is said to be the largest building of its kind in the State of Pennsylvania.

THE BRICK, TERRA-COTTA, AND SUPPLY COMPANY, Corning, N. Y., have recently closed contracts for furnishing the terra-cotta for the following new buildings: Public School, Utica, N. Y.; German Evangelical Church, Elmira, N. Y.; St. Joseph's Church, Hoboken, N. J.; Diven Block, Elmira, N. Y.; R. C. Church, Auburn, N. Y.; House of Friendless, Williamsport, Pa.

THE TIFFANY ENAMELED BRICK COMPANY, of Chicago, has been awarded the contract to furnish their white English size *dull finish* enameled brick for the front (six stories) of the Mithoff

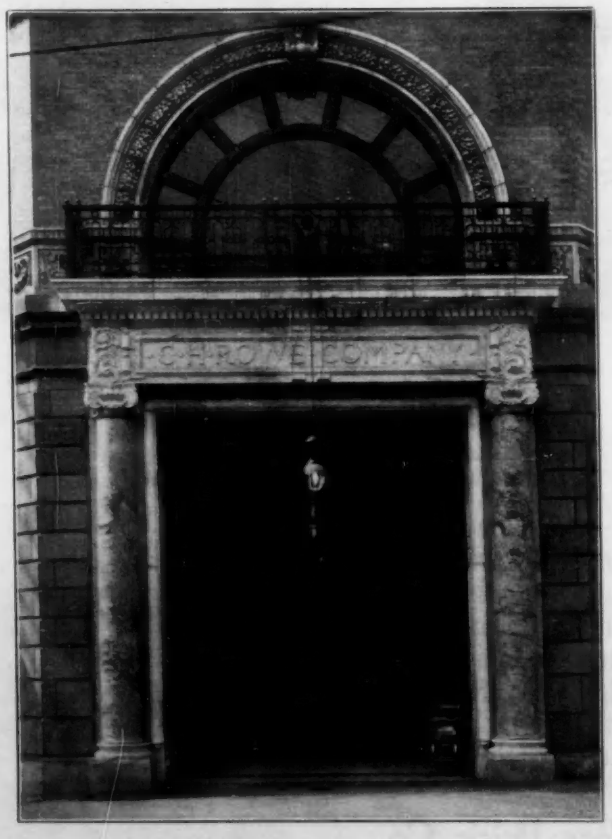
DESIGN OVER WINDOWS OF CENTRAL PARK PUMPING STATION, CHICAGO, ILL.
Executed in terra-cotta by the Northwestern Terra-Cotta Company.
Bruce Watson, City Architect.

Building, at Columbus, Ohio. The trimming will be of white enameled terra-cotta furnished by the American Terra-Cotta and Ceramic

ROWE DEPARTMENTAL STORE, PITTSBURGH, PA.
Architectural terra-cotta furnished by the Winkle Terra-Cotta Company, St. Louis.
Brick by the New York Hydraulic-Press Brick Company.
Alden & Harlow, Architects.

Company, also of Chicago. Messrs. Stribling & Fox, of Columbus, are the architects.

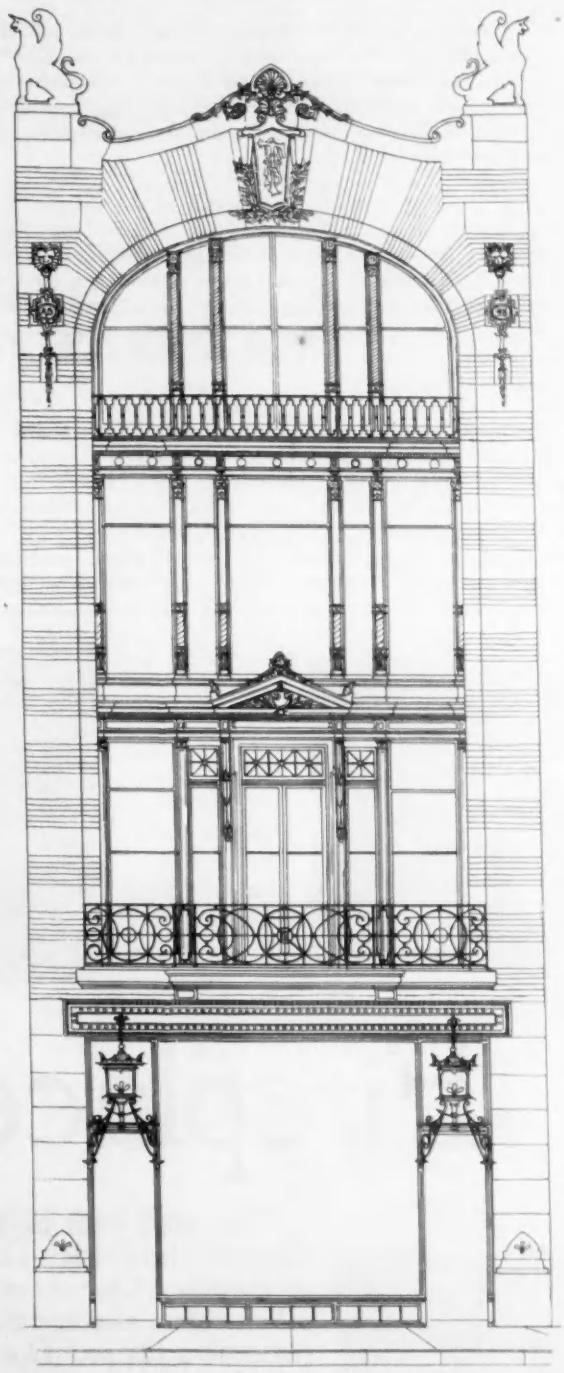
THE EVANS & HOWARD FIRE-BRICK COMPANY are supplying 75,000 buff Roman brick for a building at Spokane, Wash., Cutler & Malmgren, architects; an order for buff standards at Green Bay, Wis.; buff standards for a new building at Platteville, Wis., of which Henry Ives Cobb is the architect; also the terra-cotta for the



MAIN ENTRANCE, ROWE DEPARTMENTAL STORE, PITTSBURGH, PA.
Alden & Harlow, Architects.

new building of the Electric Railway and Light Company, at Milwaukee.

THE PITTSBURGH TERRA-COTTA LUMBER COMPANY has added to its works one at East Palestine, Ohio, where they intend making only fire-clay tile. This, with the works now at Port Murray, N. J.,



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Arthur E. Wells, Architect.

and Pittsburgh, Pa., gives the largest production of any company in the hollow-tile or porous terra-cotta fire-proofing business and enables them to reach north, south, east, and west with the lowest freight rates obtainable.

THE estate of C. M. Robertson, Montville, Conn., recently lost by fire their boiler house. In order to obviate, if possible, a like experience in the future, they have decided to put up a thoroughly fire-proof construction in its place. The building will have steel framework, brick side walls, and an absolutely fire-proof roof, consisting of corrugated iron covering laid on the Berlin Iron Bridge Company's Patent Anti-condensation Roof Lining.

MR. ROSS C. PURDY, of Buffalo, was the successful contestant for the scholarship in the Department of Ceramics of the Ohio State University, established by the National Brick Manufacturers' Association, and will accordingly have charge of the experimental work under Professor Orton's direction for the next school term, which began September 14.

THE following contracts are reported by the Celadon Terra-Cotta Company: Sherman School Building, St. Louis (flat shingle); Eliot School Building, St. Louis (flat shingle); residence for W. D. Orthwein, St. Louis (flat shingle); a row of residences for Union Mutual Life Insurance Company, Chicago, S. S. Beman, architect; building for Cook County Normal School, Chicago (closed shingle), N. S. Patton, architect; station for Union Railway Company, Des Moines, Ia. (10 in. Conosera).

THE NEW JERSEY TERRA-COTTA COMPANY will furnish the architectural terra-cotta for the following buildings: Apartments, corner 139th Street and St. Ann's Avenue, New York City, John C. Burne, architect; Manhattan Improvement Company, owners and builders; apartments, West End Avenue and 106th Street, New York City, Neville & Bagge, architects; Daily & Carlson, owners and builders; School No. 7, Bayonne, N. J., Hugh Roberts, architect; T. Burke, builder; factory, Bridgeport, Conn., Dowling & Bottomley, builders for The Union Metallic Cartridge Company.

THE ATLANTIC TERRA-COTTA COMPANY, office, 287 Fourth Avenue, New York City; factory, Tottenville, Staten Island, N. Y., wish to announce that they are now prepared to furnish architectural terra-cotta for all styles of work and would be pleased to render estimates on same.

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HOLMES, BOOTH & HAYDENS, Waterbury, Conn., are making extensive repairs and additions in their plant. The Berlin Iron Bridge Company, East Berlin, Conn., have secured the contract for the steel roof work for the boiler room, 40 by 80 ft.; the new muffle room, 35 by 80 ft.; and the new brass mill, 118 by 90 ft. These new additions are to be fire-proof throughout. The side walls are of brick, the roof supports are of steel, and the covering corrugated iron. The roofs are arranged with skylights for lighting the interior of the building, and monitors for ventilation.

THE works of the Cummings Cement Company, of Akron, N. Y., are running night and day in order to supply a number of large contracts, among which may be mentioned that of supplying fifty thousand barrels of Obelisk brand of rock cement in the construction of the Ohio Steel Company's new plant at Youngstown, O.

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Chisholm, Boyd & White Company, 57th and Wallace Sts., Chicago . . xxxix
Eastern Machinery Co., New Haven, Conn. xl
Simpson Brick Press Co., 415 Chamber of Commerce, Chicago, Ill. . . . xl
The F. D. Cummer & Sons Co., Cleveland, Ohio xxxviii

ELEVATORS.
Eastern Machinery Co., New Haven, Conn. xl
Moore & Wyman, Elevator and Machine Works, Granite St., Boston . . xxxviii

FIRE-PROOFING MATERIAL MANUFACTURERS. (See Clay Manufacturers' Agents.)
Boston Fire-proofing Co., 166 Devonshire Street, Boston xxii
Central Fireproofing Co., 874 Broadway, New York xxv
Empire Fireproofing Co., 1301 Monadnock Block, Chicago xx
Fawcett Ventilated Fire-proof Building Co., Bourse Building, Philadelphia . xxiv
New York Agent, F. L. Douglass, St. James Building, 26th St. and Broadway.
Boston Agent, James D. Lazell, 443 Tremont Bldg.
Fiske, Homes & Co., 164 Devonshire St., Boston x
Gladding, McBean & Co., San Francisco, Cal. ii
Guastavino, R., 9 East 59th St., New York xx
Boston Office, 444 Albany Street.
Maurer, Henry, & Son, 420 E. 23d St., New York City xxiii
New York & New Jersey Fire-proofing Company, 156 Fifth Ave., New York City xxi
Pioneer Fire-proof Construction Co., 1515 Marquette Building, Chicago . . xxi
Pittsburg Terra-Cotta Lumber Company, Carnegie Building, Pittsburg, Pa. . xxii
New York Office, Townsend Building, Broadway and 25th Street.
Powhatan Clay Manufacturing Company, Richmond, Va. xli
Standard Fireproofing Co., 41 Cortlandt St., New York xxi

GRANITE.
Gilbreth Seam-Face Granite Co., 85 Water St., Boston xxxiv

HANGERS.
McCabe Manufacturing Co. xxxvi
557 W. 22d St., New York City.

MAIL CHUTES.
Cutler Manufacturing Co., Rochester, N. Y. ii

MASONS' SUPPLIES.
Gilbreth Scaffold Co., 85 Water St., Boston xxxv
Hamblin & Russell Manfg. Co., Worcester, Mass. xxxvii
Waldo Brothers, 102 Milk St., Boston xix

MORTAR COLORS.
Clinton Metallic Paint Company, Clinton, N. Y. xxxii
French, Samuel H., & Co., Philadelphia, Pa. xxxi

MURESCO.
Moore, Benjamin & Co., Brooklyn, N. Y. xxxvi

PRESERVATIVE COATINGS.
Smith, Edw., & Co., 45 Broadway, N. Y. xxxiii

PLUMBING GOODS.
Randolph & Clowes, Waterbury, Conn. xxxvi

ROOFING TILES MANUFACTURERS. (See Clay Manufacturers Agents.)
The Celadon Terra-Cotta Co., Limited xxvii
Main Office and Factory, Alfred, N. Y.
Chicago Office, Marquette Building.
New York Office, 1120 Presbyterian Building, New York City.

SAFETY TREAD.
The American Mason Safety Tread Co., 40 Water St., Boston xxxiii

SNOW GUARDS.
Folsom Patent Snow Guard, 116 South St., Boston, Mass. xxxvii
Hamblin & Russell Mfg. Co., Worcester, Mass. xxxvii

VENTILATORS.
Pancoast Ventilator Co., The. 316 Bourse Building, Philadelphia, Pa. . . xxxviii

WALL TIES.
Cleveland Pat. Steel Wall Ties. Wason, Hamilton, and Dart Sts., Cleveland, Ohio xxxvii
Hamblin & Russell Manfg. Co., Worcester, Mass. xxxvii
Morse Patent Wall Ties, J. B. Prescott & Son, Mfrs., Webster, Mass. . . xxxvi

WINDOW SASH AND PULLEYS.
Queen Sash Balance Co., 150 Nassau St., New York xxxvii
The Shull Overhead Window Pulley, 116 South St., Boston xxxvii
100 Park Place, New York.
The Bolles Sash Co., 150 Nassau St., New York xxxvii

CHARLES T. HARRIS, President.
HENRY S. HARRIS, Vice-President.

WILL. R. CLARKE, Secretary and Treasurer.
ALVORD B. CLARKE, Superintendent.

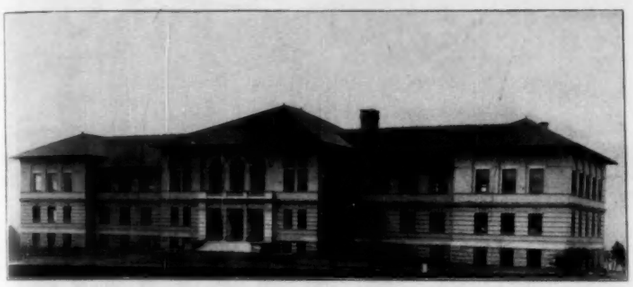
The Celadon Terra-Cotta Co., Ltd.,

MANUFACTURERS OF

ARTISTIC ROOFING TILE,

ALFRED, N. Y.

(Under Babcock Patents.)



TOWNSEND MEMORIAL HALL, OHIO STATE UNIVERSITY, COLUMBUS, O., COVERED WITH CONOSERA ROOFING TILES.
PETERS, BURNS & PRETZINGER, Dayton, O., *Architects.*

OHIO STATE UNIVERSITY.

ALEXIS COPE, *Secretary.*

COLUMBUS, O., April 18, 1898.

Mr. CHARLES T. HARRIS, Alfred, N. Y.

Dear Sir: — We have just completed two College Buildings, Townsend Hall, length 260 ft., average breadth 70 ft., three stories, and the Biological Building, length 110 ft., average breadth 75 ft., two stories, and for roofing have used Conosera Tile.

So far we have only praise to speak of it. It adds much to the dignity and artistic beauty of the buildings, and we are glad we were able to use it.

We recommend it without reservation. After seeing it on the Law and Dairy Buildings at Cornell, we were not satisfied with anything else.

Very truly yours,

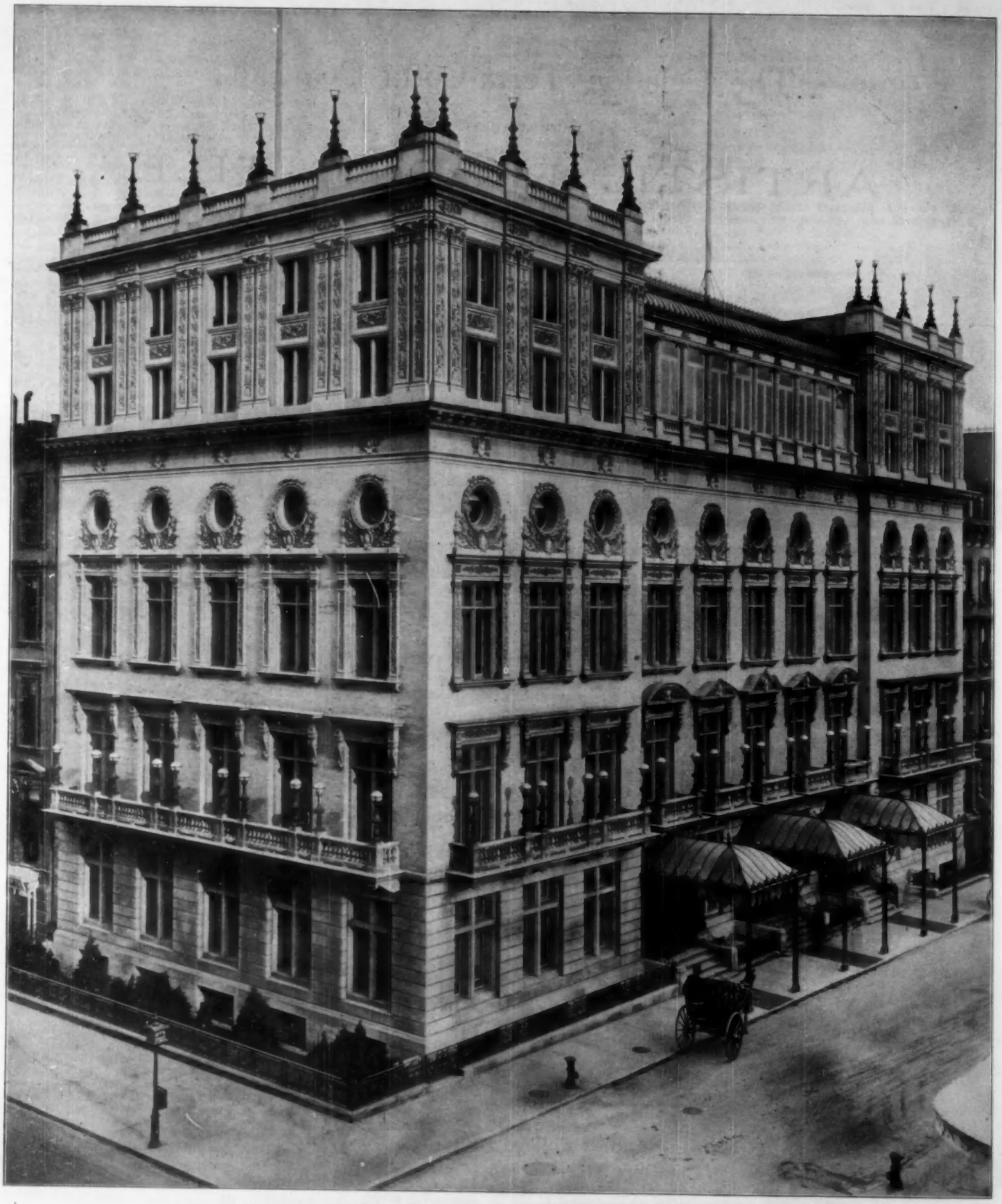
ALEXIS COPE, *Secretary.*

We have also covered the following named College Buildings, beside those named above, with Conosera Tile: —

ORRINGTON LUNT LIBRARY, Northwestern University, Evanston, Ill.
LIBRARY AT UNIVERSITY OF ILLINOIS, Urbana, Ill.
AGRICULTURAL BUILDING, Cornell University, Ithaca, N. Y.
SCIENCE HALL at Syracuse University, Syracuse, N. Y.

NEW YORK OFFICE,
SUITE 1123-4, PRESBYTERIAN BUILDING, 156 FIFTH AVENUE.

CHICAGO OFFICE,
SUITE 1001-2, MARQUETTE BUILDING, 204 DEARBORN STREET.



THE DELMONICO BUILDING, 44TH STREET AND FIFTH AVE., NEW YORK CITY.
JAMES BROWN LORD, ARCHITECT.

TERRA-COTTA AND BRICK BY THE

NEW YORK ARCHITECTURAL TERRA-COTTA COMPANY,

PHILADELPHIA. 38 PARK ROW, NEW YORK CITY. BOSTON.